

Ethnobotany



Prepared by Robert G. Bedrosian

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[Plant Hallucinogens: Sacred Elements of Native Societies](#). This beautiful and rare chart was issued by Richard Evans Schultes and illustrated by Elmer W. Smith in 1980. Schultes, a renowned ethnobotanist and Director of the Harvard Botanical Museum, describes entheogens used in the Old and New Worlds by indigenous peoples. Amplified to include links to Google Images and Wikipedia entries. At Internet Archive.

[Art and Artifact as Ethnobotanical Tools in the Ancient Near East with Emphasis on Psychoactive Plants](#), by William A. Emboden, Jr., from *Ethnobotany Evolution of a Discipline*, edited by Richard Evans Schultes and Siri von Reis (Portland, 1995), pp. 93-107, in 17 pdf pages.

[Gods and Plants in the Classical World](#), by Carl A. P. Ruck, from *Ethnobotany, Evolution of a Discipline* (Portland, 1997), pp. 131-143, in 11 pdf pages.

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[volume 1](#): Stars, planets, aerial phenomena, world geography.

[volume 2](#): Geography continued, humanity, life cycles, terrestrial animals, fish, birds.

[Volume 3](#): Insects, trees.

[Volume 4](#): Grains, plants, remedies from plants, flowers, properties of plants and fruits, remedies from cultivated trees.

[Volume 5](#): Remedies from forest trees, wild plants, remedies classified by disease, remedies from living creatures, remedies from waters.

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Richard Evans Schultes

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R. Gordon Wasson

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Chapters 2-4 from William Emboden's *Bizarre Plants, Magical, Monstrous, Mythical* (New York, 1974). The author's erudition and engaging prose style make this material spellbinding reading:

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[Satan's Simples: The Herbs of Black Magic](#), in 30 pdf pages.

[Herbs of Grace: Witches and Warlocks Undone](#), in 26 pdf pages.

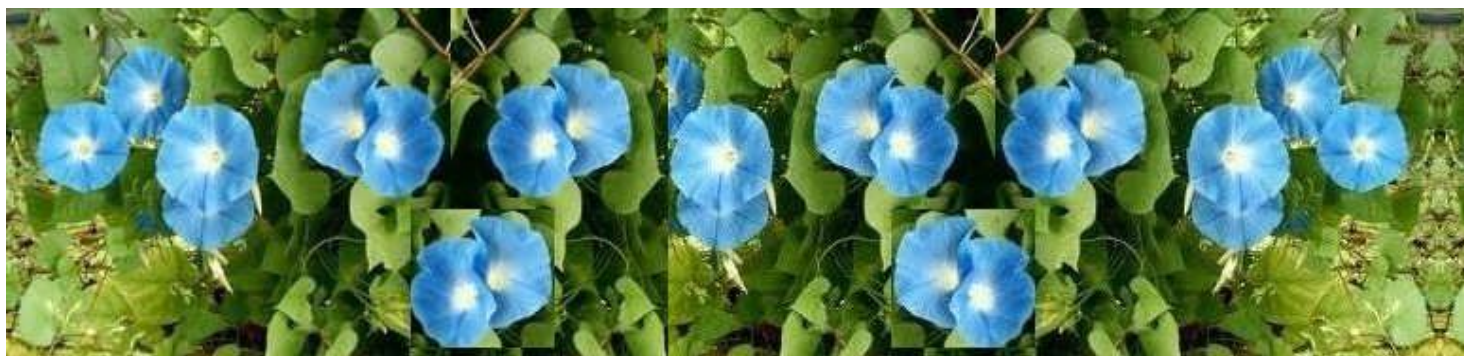
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[Traditional Medicine in Turkey VIII. Folk Medicine in East Anatolia](#), by Ekrem Sezik, Erdem Yeşilada, Mamoru Tabata, Gisho Honda, Yoshihisa Takaishi, Tetsuro Fujita, Toshihiro Tanaka and Yoshio Takeda, from *Economic Botany*, Vol. 51, No. 3 (Jul. - Sep., 1997), pp. 195-211, in 18 pdf pages. Surveyed are the districts of Erzurum, Erzincan, Ağrı/Ararat, Kars, and Iğdır/Tsolakert.



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Of Historical Interest

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Also available at Internet Archive:

[Ancient and Medieval Gardens](#)
[Plant Aphrodisiacs](#)

Art and Artifact as Ethnobotanical Tools in the Ancient Near East with Emphasis on Psychoactive Plants*

by William A. Emboden, Jr.

(Portland, Oregon, 1995)

*This material, which is presented solely for non-commercial educational/research purposes, appears in *Ethnobotany, Evolution of a Discipline* (Portland, Oregon, 1995; reprinted 1997), Richard Evans Schultes and Siri von Reis, ed., pp. 93-107.

[93]

While there is considerable research on agriculture of the ancient Near East, most of the writing has dealt with sustenance crops such as grains, pulses, dates, and others. Various practices in agriculture at an early date in this area have been discussed by modern writers, but reliance on silting still seems to be the most plausible explanation for a stabilized agriculture practice. Gathered plants are not excluded by the progressive movement into new agricultural modalities.

Most neglected, and still very controversial, are the several kinds of psychoactive plants employed by early peoples. It is suggested that art and artifact have been sources often overlooked in determining the ethnobotanical content of any early civilization. The suggestion is made that early civilizations in the area of the Fertile Crescent employed *Datura*, *Cannabis*, *Claviceps*, *Mandragora*, *Nymphaea*, *Vitis*, and possibly *Papaver* as medicaments and ritual entheogens. They are well revealed in the surviving art and artifacts of these civilizations. As many of the images are imprecise in their execution, identification must be made in the context in which they are represented and is therefore often conjectural.

In the sciences, ethnobotany is one of the most recent and rapidly expanding disciplines, as exemplified by two relatively new and important publications, the *Journal of Ethnopharmacology* and the *Journal of Ethnobiology*. These publications were born as it became abundantly evident that ethnobotanical articles were being buried in journals devoted to other disciplines; and, yet, more and more scientists were turning to this multifaceted study. Unlike the more conventional branches of science, ethnobotany relies upon a greater database than does any other scientific discipline. Anthropology, archeology, pharmacology, biochemistry, and the many areas that comprise biology are all components of the broad discipline of ethnobotany. The earlier term *economic botany* was something of a misnomer in that it implied only economic considerations of the plant sciences, although it often was used to cover courses and writings in the area now defined as ethnobotany.

At a time when many molecular biologists have almost forgotten the uses of the past, the ethnobotanist is assembling historical art and artifact as part of the database. Further [94] verification of assertions and hypotheses deriving from these sources may come from analytical chemistry or electron microscopy, but it is mandatory to have individuals well trained in diverse areas to bring together, and make sense of, the pieces left to us by former civilizations and contemporary civilizations threatened with extinction. To this end, we need ethnomusicologists, ethnomycologists, pharmacologists, analytical chemists, computer scientists, biochemists and, primarily, botanists who are well grounded in biology and have an interest in history.

It is important to note that the discipline of ethnobotany has been able to advance on the basis of two primary developments, both from the first half of the twentieth century: first, the evolution of a technology that allows rapid analysis of materials and data; and second, the discovery of ancient civilizations as something more than curiosities. The origins of Western civilization can be traced to the ancient Near East, which was unknown to the greatest of the Greek writers of antiquity and was regarded until late as a false start in the development of both art and science. We have preferred to think of our own civilization as having developed from Hellenic thought and

values. Despite the enormous accumulations of art and artifacts that were garnered during the nineteenth century, interpretation of these materials was not forthcoming. While the picture is still fragmentary, we now are able to interpret correctly much of what was formerly regarded as merely decorative.

It was the Neolithic revolution that initiated the ordered life of social stratification within settled communities. Following this, more complicated federations of communities rose in a city-state plexus that required political systems, agricultural priesthood, currency, and economic systems, and that permitted the development of the luxuries of art and writing. All of this happened about the fifth or fourth millennium B.C. in what has been called the Fertile Crescent of arable land surrounding the wilderness of Arabia. The area included Egypt, Palestine, Syria, and Mesopotamia, which, until the end of the fourth millennium [ca. 3000 B.C.], remained an unassimilated complex of simple villages with primitive agriculture and tribal principles rather than any ordered governments.

In a few generations perhaps the greatest transformation in the history of humankind took place. Writing appeared, monumental architecture rose from rubble, agriculture underwent revolutionary changes, governments replaced less-than-feudal states, and religion and science made their appearances. Like an estivation period followed by germination, a succession of cities grew, blossomed, and reached fruition. [In Western Asia,] Egypt and Mesopotamia were the luminaries of this great period of art, architecture, science, and engineering. Long before any written record appeared, these civilizations had produced sculpture and painting so imbued with information that they codify thought in many ways similar to written language. Syria, Palestine, Sumeria, Anatolia, and the Levant were perhaps lesser luminaries, but they blazed a trail like a comet and, in regard to ethnobotanical data, made contributions as important as those of Egypt and Mesopotamia.

It is important to understand that early civilizations tied artistic expression to religion and that this religion was based upon magic—the magic that comes from grain, from brewing, from states of elevated consciousness associated with plants, from pain relievers, from healing herbs, and from resinous plants for embalming the body. In brief, the art of this early period and of these cultures is a revelation of riches for the ethnobotanist.

In this paper, I would not propose to do the work of the anthropologist, archaeologist, or theologian. Instead, I will suggest, from their discoveries, thematic materials that either have been neglected or have been subjected to alternative interpretations or to an extension of ideas that have been only partially formulated.

Egypt and Sumeria share the trait of being two great river valleys in which agriculture could flourish through silting. No civilization develops in the absence of a stable agricultural base. In Egypt, the progressive aridity of North Africa and the Levant drove peoples into the Nile Delta and thus became the determining factor as to where a settled existence [95] might emerge. Likewise in Mesopotamia, the Sumerians, a non-Semitic and non-Indo-European people, at the beginning of the third millennium B.C. gave birth to an independent art that reflected their preoccupations during this preliterate period. It would be yet another seven centuries before writing would appear in clay tabature, but the vessels of this epoch are revealing in form, in floral patterns, and in the animals depicted. These independent creations are in many ways similar to the vessels found in the escarpments and caves that escaped the periodic inundation of the Nile Delta.

Mesopotamia was settled by people who left the increasingly arid Persian Gulf region and who had earlier made their homes in the Iranian highlands. In their new homeland, they settled on islands and banks around marshes and relied upon annual flooding of the rivers, as well as on their own irrigation ditches, in which they probably cultivated small fish and edible aquatics such as the boiled rhizomes of *Nymphaea* species. The silting of vast areas allowed the planting of barley and wheat. Reed-clay huts rapidly gave way to an astonishing originality in terra-cotta and in brick architecture. From this period, we have two art forms: pottery that goes beyond ornamentation (meaningfully painted and incised) and figurines. Since the discovery of these two forms, weavings with designs have been found at Eridu in a grave dating to 3500 B.C.

Persepolis and Susa provide the first example of brush painting on pottery that goes beyond ornamentation. By the end of the second millennium B.C., the vessels are of exceedingly varied form. The designs are plant and animal motifs, and occasionally a human figure. It is hard to agree with Lloyd (1961, p. 302) that the appearance of the

human form, such as a hunter with a bow, has the sole function of filling a gap in a design. The compositions are too well conceived to permit such "gaps" and, as Coe (1973) has said of the Maya, these people did not decorate; rather they depicted reality in all their art and artifacts. Certainly, the hunter with his bow becomes a focal figure in a civilization that is still hunting-gathering; his vocation is pivotal to the survival of the civilization. Likewise, Lloyd (1961, p. 302) referred to depictions of beasts and birds as being "irrelevant, since the painter himself, concerned only with its decorative value, may well have been ignorant of its traditional significance." My response is this: we need not concern ourselves with traditional themes in such an early civilization; rather we must see these people as depicting their reality and certainly not merely decorating.

Fish were a primary food source. The ibis may be viewed in the context in which birds have been viewed in early civilizations: as shamanic manifestations. The concept extends from the raven of the early Eskimos to the dove-Holy Ghost theme in early Christian iconography and hagiography. Horses, birds, dogs, fish, and floral motifs are treated by Lloyd (1961, p.24, fig.6) as "mere hieroglyphs." Such hieroglyphs are precursors of language and were the embodiment of thought of the time; the facile dismissal of such themes is unfortunate. Lloyd's assertion that "the great majority (of animal figures) are crudely made playthings for children and of no artistic interest" [pp. 24-25] contrasts with his statement that those which are based upon human forms place them in the category of cult objects.

If ethnobotanists have made one great contribution, it is, I believe, to rethink these things that previously have been considered unworthy of serious consideration. It is not necessary to give excessively plastic expression to these abstracted ideas to find them meaningful. In one polychrome bowl of Tell Halaf ware from northern Mesopotamia, a central floral motif of anthers surrounded by numerous petals suggests a water lily or *Nymphaea*. While such identity is tentative, the water lily is a prime contender for any illustration of marshland plants. Further, the narcotic qualities of the flowers (Emboden 1981, 1982a, 1982b) and the edibility of the rhizome after boiling and leaching would [96] make it a floral emblem *par excellence*, telling us much about life and religion, as opposed to the writing of the Al 'Ubaid phase of Mesopotamian development. This tablature was reserved specifically for the purpose of inventory of goods and administration, but in it we are able to identify aspects of ethnobotany, such as payment in grain, bread, and beer, which give us a glimpse of the role of plants in an emerging civilization.

The earliest records from the ancient Near East indicate that healing was accomplished by incantations and plants; both were seen as ridding the ailing body of demonic possession. Persons capable of eliciting in themselves and others states of hypnosis, delirium, or psychological transcendence made up a caste of shamans who mediated the journey of the spirit from the realm of the seen to that of the unseen and whose powers to cast out demons resided in numerous plants. Each plant was known by a name that more often characterized power than it described plant morphology or attributes.

Babylonian medicine most probably was carried into eastern Mesopotamia and Assyria by caravan routes. We know that a number of the plants mentioned in Assyrian tablature are Sumerian. One Babylonian record dating to 2250 B.C. indicates that Babylonia and Egypt then had a trade in drugs and that most of these were oils, gums, and resins. Oils provided a matrix for the carriage of several kinds of drugs.

Babylonian and Assyrian medicine is known primarily through an assemblage of clay tablets from the library of the palace of Assurbanipal, the Assyrian king who ruled Nineveh from 668 to 626 B.C. About 800 pieces of these tablets consist of medical texts that are believed to be of Babylonian origin in thought and that refer to a period between 3000 and 2000 B.C. Evidence to that end, in the absence of a written language, must come from art and artifacts: pottery shards, textile patterns, paintings, implements, stelae, statuary, and even architectural layout. The ethnobotanist must regard all these as tools to the unlocking of the complex pattern of plant use in these earliest of civilizations. The alternative is to use derivative texts, which in some instances may be misleading. The union of art and artifact with later writings provides a base for understanding the earliest uses of plants and plant products. Chemistry may further validate finds, such as residues in unguent jars.

Thompson (1924) cited about 250 drugs of vegetable origin as present in the Assurbanipal tablet. These are, however, compounded and often represent diverse combinations of important plants. Some can be identified; others must remain unknown, owing to the absence of relevant figures and morphological data. It should be noted that only 120 mineral substances are mentioned as medicaments, thus placing plants in the forefront of early medicine. According to the translations of R. Campbell Thompson, these plants include almond (oil), asafoetida, calendula, chamomile, ergot, fennel, henbane, myrrh, liquorice, lupine, mandrake, opium poppy, pomegranate, saffron, and turmeric. *Cannabis*, which figures prominently in healing in China and India, also would have been a major element of barter along the early trade routes leading into and out of Assyria.

Poultices of plant substances were common, and there is every reason to believe that were efficacious. Turnips were kneaded with milk to make a poultice paste, as were barley and wheat flours. It is worth noting that "rotten grain" was prescribed. While this may have been a practice to help conserve fresh grain, it also served to introduce fungus-infected grains to the areas of wounds. These fungi undoubtedly produced some antibiotics that assisted the healing process of the poultice.

Stomach pains seem to figure high on the list of common complaints, and to this end the family Apiaceae is most commonly recommended for such ailments. Herbs, seeds, roots, and resins frequently were macerated and put into beer or wine as a method of dispersing oils and other components that might not have been soluble in water. Oils, honey, and herbs were mixed with wine to be administered by clyster. Enemas, both warm and cold, are registered in this early tablet.

[97]

Disease is called "the hand of the spirit demon" in this codified material from Assurbanipal, and one of the common ways of driving out the spirit is fumigation. All oil-producing plants may be placed on hot coals to produce fragrant smoke. In this context, it is significant to note that the majority of plant oils investigated have bactericidal or bacteriostatic properties, as well as fungistatic virtues, and that as fumigants they no doubt served the purpose for which they were used. This ancient ritual has come down to the censers of the contemporary Catholic church and the spicers that are found in Orthodox synagogues. Wherever crowds of people gathered, ritual purification of the air was conducted to drive out demons. In reality, the custom served to discourage the dissemination of disease-causing organisms. In the same manner, fragrant plants laden with volatile oils were placed upon the floors of temples and houses to be crushed under foot, thus releasing these oils into the air—shades of the aerosols that dominate Western homes!

It is worth noting that the healers were not all men. One of the earliest Babylonian tablets from Nippa, dating from the kings of the Babylonian dynasty of circa 2000 B.C., mentions a shaman as Pir-Napistum of the school of healing of Eridu. He is called to heal but designates the task to his wife, a healing priestess. For a comatose patient she makes a vegetable and herbal poultice and cooks it in water. The mass placed upon the patient's head causes him to awaken, and he is then instructed to eat the medicinal concoction. This "magic food" recalls the practices of Native Americans who did not distinguish between food and medicine but were concerned with plants as "power" (Vogel 1970, p. 583).

By contrast, Egyptian hieroglyphs correspond to the emergence of the dynastic periods and virtually explode with a wealth of information about religion, politics, predynastic periods, and most important, agriculture. The information is incised in stone in Egyptian pre-dynastic art and only later is found in papyri.

Of this period, one of the most exquisite and informative intaglio pieces is an enormous, presumably votive mace-head from Hierakonpolis (in the Ashmolean Museum) celebrating the Scorpion King of Upper Egypt. Anthropologists have concentrated on the activities of this Scorpion King in opening a canal and consolidating the Upper Egyptian kingdoms, and on the mace as an emblem of power akin to the scepter of contemporary coronations. Apart from this overt interpretation and signature of high office, attention should be drawn to the form of the piece, its relief, and its intaglio iconography. True to the typical mace-head, it is obovoid and drilled; however, the concentric rings (the first to cap the mace-head) have between them an entire circle of horizontal

lines in relief. Below are successive layers of depictions interrupted by stately palms. Plants are shown having globose heads but no leaves.

Is it possible that this mace-head is a modified opium poppy capsule? It has circumscissile dehiscence as a motif and the aforementioned stylized plants. If this be the case, the appearance of an opium poppy in this area would be in opposition to the studies of Krikorian (1975), who claimed that if we are to validate the opium poppy as a plant of the ancient Near East, we should have evidence in the form of the seeds or capsules themselves. Seeds are so small as to disappear easily; both seeds and capsule probably would deteriorate over thousands of years. Perhaps the finest records are those incised in stone. Any such assertion, however, must be taken as a hypothesis requiring further evidence for validation.

Papaver somniferum is widely accepted to be the result of domestication of the wild *P. setigerum*, but a time-scale for such an event is imperfectly known. Poppy seeds and pods have been found in bogs and lakes of the third millennium B.C. in north central Europe. Gongora (1868) wrote of finding 55,000-year-old poppy capsules and seeds in a limestone cave near the area of Spain now known as Granada, but he saw these only as symbols and neglected their psychoactive properties. The seeds are nutritious and a fine source of both proteins and oils, while the unripe fruit latex provides opium.

[98]

Thompson (1924) asserted that the Akkadian word *irru* was used to designate the opium poppy. While his philological reasoning was sound, his errors in the identification of other plants led to a rather generalized criticism of his scholarship. Thompson believed that there were cognates in the Sumerian texts, but Krikorian (1975) refuted this suggestion on philological grounds. Kritikos and Papadaki (1967) cited R. Dougherty, former curator of the Babylonian Collection at Yale University, to support the contention that the opium poppy was known to the Sumerians in the third millennium B.C. Those who take exception to the *Hul Gil* ideograms must contend, however, with the union of these glyphs with associated quotations, cited by Thompson, in which this plant is presented with such connections as this: "Early in this morning old women, boys and girls collect the juice, scraping it off the notches (of the poppy capsule) with a small iron blade and place it within a clay receptacle." Sonnendecker (1962) asserted that the *Hul Gil* ideograms may be found in Sumerian tablets of the fourth millennium B.C. Marinates (1948, p. 85) cited the goddess Nisaba of Babylonia and Assyria as portrayed with opium poppies growing out of her shoulders!

In the absence of any seed or capsules from this early date, we are left with conjecture and debate as to the real antiquity of the opium poppy in this region. Nonetheless, the plant is mentioned forty-two times in tablature of the temple of Assurbanipal.

Ancient Uruk or Warka has given us an extraordinary stone vase upon which plants are figured in the lower register [Figure 1. [Images of the Warka Vase](#)]. This rare find from the alluvial plains of southern Iraq depicts a religious scene incised in alabaster, the figures being left in relief. The plant forms are varied; all have leaves and flowers or fruits, but the level of stylization precludes identification. Given, in the vase, the tendency toward the depiction of mythical and monstrous beasts, we may well expect to encounter equally mythical plants, which have no counterpart in the real world. On the other hand, the very nature of the technique limits the details that can be successfully expressed. One wonders what important plants these might be.

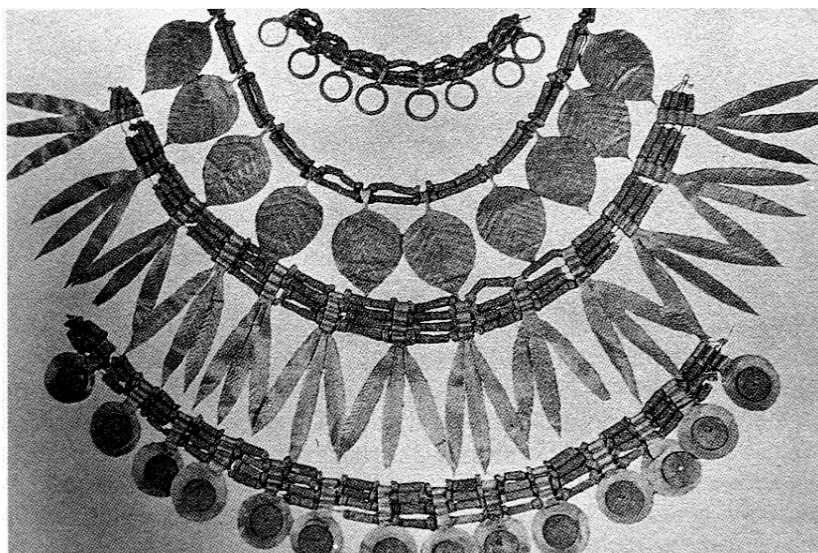
Any evidence that might be used to link Egypt and Mesopotamia during the final centuries of the fourth millennium B.C. must be found by way of resemblances in art, architecture, pictographic writing, and the conventions expressed in all these. It is very difficult to account for all the similarities, and evidence for physical contact between these anthropologically unrelated peoples is equivocal at best. Also, we are overwhelmed by the amount of tomb intaglio and murals from Egypt, which far exceeds the entire [99] corresponding anthropological and archeological remains of all the other collective lands of the ancient Near East.

In the third millennium B.C., Sumerian civilization was flourishing in the alluvial basin at the head of the Persian Gulf as an amalgamation of city-states (much like the Classical and post-Classical Maya civilization), each ruled by an oligarchy. This is the early dynastic period of Sumeria, with Ur, Erech, and Kish as three of its leading cities. Agriculture progressed as the result of irrigation canals that served to move people and objects, as well as rich muck and water, to parched lands. There can be little doubt that the small fish of these canals were netted as food and that the aquatic rhizomes of *Nymphaea*, when boiled and leached, could provide a crude carbohydrate. The same rhizomes, when raw, or the flower buds, when macerated, could provide a psychoactive decoction (Emboden 1982a).

A series of cylinders or rollers cut in intaglio and rolled upon pitch or clay leaves records daily life and religious activities. On one such cylinder, there is incised the figure of a plant with three giant flower buds emerging from five mounds (rhizomes or bulbs?) and protected by crouching, masked bulls. Human figures are on either side of the bull-minotaurs, protecting them from the attack of some monstrous bird. The three flowers strongly suggest the repeated early dynastic symbol of ancient Egypt in which this sacred trinity of flowers is found with a very high frequency (Bands 1953; Emboden 1981).

One of the great treasures of early dynastic Ur is a headdress of leaves of beaten gold and three large flowers with eight petals and a center of carnelian. The leaves are obovate with acuminate tips and may not relate to the flowers. The diameter of the flowers being approximately 12 to 15 centimeters (5 to 6 inches) suggests that they may represent the water lily or perhaps the opium poppy with the carnelian being interpreted as the capsule contained within the corolla. With this headdress, found by the Woolley Expedition, was a necklace of leaves that are obovate with acuminate tips and another rank of leaves in beaten gold that strongly suggest *Cannabis*.

Figure 2. Necklace from Ur showing Cannabis-like leaves. Iraq Museum.



Others (Lloyd 1961, p. 88) have suggested willow (*Salix*), but the venation is more like that of *Cannabis*, as is the leaf morphology.

In early dynastic Egypt the flower of *Nymphaea* is regularly found in the headdresses [100] of figures in tomb murals. At Ur, the famous [Ram in a Thicket](#) [Figure 3. Ram (Tammuz) representation. The branched plant has two remaining flowers that suggest *Papaver*. British Museum.] is an emblem of the strength of Tammuz. The goat was an emblem of virility, and the "thicket" is a highly formalized plant of oppositely branched dichotomies of eight appendages. Two of these bear the same eight-petaled, beaten gold flowers with golden centers. The formality of the presentation makes it difficult to visualize the goat as simply a goat. Aspects of a deity mark the animal in its

stance before the sacred plant upon which it rests its hooves. This goat-man is akin to Hellenic satyrs and centaurs. It is clearly a hybridized motif, and the portrayal is of a priestly order.

The ruling class of Mesopotamia was altered by a seemingly peaceful ascendancy of Semitic Akkadians into the ruling classes. Unfortunately, the amount of extant Akkadian art is limited, but the few pieces known to art historians are of extremely high esthetic and technological merit. The Gutti tribes from Iran's mountains overran all Sumeria except Lagash, where the Sumerian tradition seemed to have continued its development toward progressive refinement and naturalistic depiction. During this same time, Egypt was undergoing serious changes as the pharaohs were overthrown by a feudal noble class that brought with it war and anarchy.

Not until the final years of the third millennium [ca. 2000 B.C.] was there an Egyptian revival; it [101] appeared with the initiation of the Middle Kingdom. The cult of Ra was replaced by the Osirian tradition of death and resurrection not unlike the Mesopotamian legends of Tammuz. The importance of this to the anthropologist, archeologist, and ethnobotanist is that with the Osirian tradition came the establishment of refined tomb art in Upper Egypt. Events of ordinary life frequently are portrayed in these tombs, and arid conditions have left much of the tempera painting intact. Brewing of beer, viticulture, oenology, grain harvest, and preoccupation with the sacred water lily are all strongly evident.

According to the mycological researches of R. Gordon Wasson (1970), a people calling themselves Aryans descended from the north through Afghanistan to occupy the Indus valleys. These were Iranians (Aryan being a cognate). In the land from Palestine to Mesopotamia and Iran, settled in succession by the Sumerians, the Hittites, the Mitannians, and finally by the Indo-Iranians or Aryans, there is an amalgamation of shared legend and mythology. It is Wasson's contention that the Gilgamesh legend of the quest for the miraculous herb that is taken from him by a serpent is a common legend reaching throughout Eurasia from as far back as the Stone Age. Wasson asserts that the Soma-Haoma myth relates to the fly-agaric mushroom (*Amanita muscaria*) and that this related to sacred-tree mythology in that the birch tree supports fly-agaric in a mycorrhizal relationship in which fly-agaric is, in a secondary way, the "fruit" of that sacred tree [[Images of the Amanita Muscaria Mushroom](#)].

Amanita muscaria contains ibotenic acid which breaks down to muscimole and muscazone, psychoactive agents that would serve as a fine adjunct to shamanic ecstasis. The fungus does not grow in the areas of the ancient Near East but may have been brought by the invaders as the sacrament that figures in their sacred books, collection of poems, and the *Rig Veda*, and around which much music, liturgy, and philosophy is centered. The Aryan invasion of 3500 years ago, in the second millennium [ca. 1500 B.C.], presumably introduced this plant that subsequently was lost or forgotten about 3000 years ago when its use was abandoned by the priesthood. We are left to wonder why there are no remains or records of this sacred mushroom in any of these areas of contact. Wasson's thesis is most intriguing and possibly correct, but ethnobotanists must continue to look for more clues in every aspect of art and artifact to validate such assertions. Certainly it would be most interesting to add this plant to those many already suggested.

The richness of the Egyptian Middle Kingdom is paralleled by an astonishing period of Mesopotamian art little recoverable from other than a limited cache of rollers or cylinders. Fragments of sculpture, the famous Hammurabi stela, and the great walled temples of Uruk, Kish, Eridu, and Nippur remain. One area, Mari, on the Middle Euphrates, leaves us with the finest remaining statuary and a small number of wall paintings showing palms and trees with enormous, presumably mythical, flowers. The rest of Mesopotamia fell into Kassite (Iranian) hands and inherited the impoverished vestige of the Gutti rule. Imagination became stereotyped. In the second millennium, Assyrian merchants brought Mesopotamia's civilization to Anatolia, and clay tablets indicate that the Anatolian plateau had in it elements of an Indo-European culture, that of the Hittites who would later unite Anatolia in the east.

If the opium poppy had not previously entered Near Eastern civilization, it certainly would have done so at this time. Such a contention may be based in part upon a famous Assyrian fertility seal in which Athirat or Ashera (the Mesopotamian Ishtar) is shown with a magical plant, two priests, and two winged demons with "pollen bags." It is the last that has led to a suggestion that the magical tree is the date palm, which the Assyrians knew to be divided

into sexes. Pollination was practiced as an essentially magical act. The form of the plant, however, is that of either a poppy or a pomegranate, neither of which require deliberate pollination. The pomegranate, because of its copious seed, is an obvious emblem of fertility, while the poppy is emblematic of power, for reason of its conquest over pain and grief. It is for this reason that the poppy goddess of Knossos wears [102] a corona of three poppy capsules. Ishtar is associated more often with magical plants than with fertility, and the temptation is to make the association with the poppy, rather than with the pomegranate.



In both Sumerian and Akkadian myths, Ishtar (Inanna) descends into the underworld (much like the later stories of Persephone), where she undergoes shamanic death, to be rescued three days later by two sexless creatures (the cult of Ishtar-Inanna involved eunuchs) who finally return her to her own city of Erech. Thus, she is associated with the shamanic sleep of death that is the essential quality of the opium poppy. Hence, it is not unrealistic to associate the "Ishtar cylinder" with the poppy. Further evidence derives from the intense preoccupation of Ishtar worship with magic involving plague amulets, exorcism, and later, dream divination.

Plants also figure in these practices. The onion, *Allium*, was used in medicine, divination, and exorcism. Possession, as the result of misdeeds and broken taboos, could lead to the offender being given an onion bulb by a shaman. Each successive layer of the onion represented a misdeed that could be obliterated by peeling the layer and throwing it into a magical fire in which it was burnt to oblivion. This manner of voiding transgressions also symbolized the removal of skin and flesh from the skeleton, a common shamanic theme in diverse cultures.

In a similar manner, wheat and barley made into bread not only were eaten or made into poultices but, when moldy, served a magical purpose. A loaf of bread placed upon the head of an ailing child would draw the sickness, by magic, into the bread. The loaf then would be rubbed down the child's body from head to foot. Ultimately, the loaf would be eaten or thrown to a dog who magically would take up the child's ailments.

Plants figure in the earliest Sumerian and Babylonian mythology, namely, the legend of Gilgamesh. The antiquity of this legend is attested to be about the identification of the father of Agga, king of Kish and foe of Gilgamesh, on

an alabaster bowl, dating to circa 2700 B.C., from the Diyala Valley. Many later versions exist. Fragments of the narrative are dated to nearly the end of the third millennium B.C. In the course of his journey in search of the plant of immortality, the protagonist passes through a magical garden in which grapes of carnelian and lapis lazuli produce a magical wine. In the eleventh tablet, Gilgamesh descends into the sea to find the plant of immortality. On the journey back to his homeland, the plant is taken from him by a serpent. In the last (twelfth) tablet is a fascinating episode involving a willow tree (*Salix*) guarded and coveted by Inanna (Ishtar). Of the many plants that might have figured in such a legend, it is curious that the willow tree should happen to be the most common source of the most popular analgesic medicine. Salicin, found in its young twigs and leaves, removes pain and inflammation and is the antecedent of modern aspirin.

From the Sumerian triumph of architecture, agriculture, art, and cuneiform script, we have by circa 2000 B.C. the barbarian movement into this civilization to shifting some of its finest populace into the Aegean and Anatolian civilizations under Greeks and Hittites. The question still remains, why were these people so vulnerable? Had their civilization already peaked, and, if so, what was the reason for the decline? As with other civilizations, we may look to agriculture.

Prior to 8000 B.C., wheat was a grass common to the Fertile Crescent that was to become Mesopotamia and the cradle of civilization. This wild wheat crossed with a "goat grass"; and the progeny subsequently formed a hybrid known as emmer (*Triticum dicoccum*), the plump grains of which could support a civilization. A subsequent hybridization produced even more heterozygosis and eliminated a brittle rachis that had necessitated hand harvesting. The grain would not shatter from the plant through the action of wind as had the wild form before it.

The Sumerians learned how to cultivate this wheat and also barley, native to that [103] area in diverse forms, and soon were trading grain for lapis lazuli and carnelian. In the Ubaid and Uruk periods, wheat was widely cultivated and was almost a monopoly, but as early as early dynastic times, wheat production began to decline owing to improper and excessive irrigation, as well as to a corresponding salinization of the land. This led to the predominance of barley, which is much more tolerant of excess salt in the soil. Thus, by 3000 B.C., trade routes between Mesopotamia and Iran had to be opened and negotiated through mountain passes and river valleys. By the end of the early dynastic period, a transit trade route was established between south Mesopotamia and the Indus valley.

While art historians tend to speak of the embellishments in art, architecture, and artifacts, ethnobotanists may find considerable other ramifications. Many writers have ignored the extensive agricultural diversity of crop plants and medicinal plants that entered and exited by these extensive land-sea routes. Crops of grain and other food stuffs alone will not suffice to sustain populations for any considerable period of time. The role of medicinal and drug plants is perhaps as important as that of food plants and may have been as significant a factor in the establishment and maintenance of the first civilizations as was the more evident grain.

The Uruk period saw the first appearance of open cast copper chisels. An axe of this period was found in Susiana, and it was bound in linen, attesting to the knowledge of the growing, retting, and removal of fibers of linen from *Linum*. The production of linen sacks allowed grain to be stored under circumstances in which it was less likely to rot (e.g., animal skins or pottery). Fabric came to replace animal skin as the exclusive clothing of these early civilizations. Linen provided the ideal container for grain and artifacts to be carried along difficult trade routes. The ropes tying the sacks shut were sealed with resins or pitch in which cylinders were rolled to leave an impression giving specific categories of information. Cylinder imprints also served to identify early wines and vineyards. Rolled in pine pitch used to seal the amphoras of wine in early Egypt and subsequently in Hellenic civilizations, these cylinder impressions gave the area of cultivation, the cultivator, and the date.

The years surrounding 2500 B.C. are important in that they mark what one might characterize as the end of several early periods. Egypt at this time had just entered the Old Kingdom period, which followed the proto-dynastic period. Mesopotamia was well into its early dynastic phases. Anatolia was in the Second Early Bronze Age. A new kind of sophistication was appearing in most areas of the ancient Near East. Architecture was beginning to have a certain grandeur, ritual was becoming stratified by hierarchies of priests, trade routes were

becoming well established, and the luxuries of life were coming into evidence in increasingly large numbers of nonessential items such as jewelry, nonritual artifacts, elaborate furniture, and all the ornamentation that can be afforded only by an advanced civilization free from subsistence patterns.

As castes grew in hierarchies of priests, the shaman-priest was concerned with prophesy or divination. Egypt had to build diverse centers of religious activity to accommodate the division of labor among the elite. Magical and medical papyri grew in number. Agriculture was well established as a result of inundation and limited crop irrigation by canals. Emmer, flax (*Linum*), two kinds of barley (Upper Egyptian and Lower Egyptian), and, after the Ptolemaic period, wheat became the principal crops. The extraordinary amounts and varieties of beer produced were made not from grain, but from barley bread that was fermented—a far less wasteful practice, since unused bread would be recycled as beer and the leftover mash fed to domestic animals.

The various papyri are often diverse in content. Thus, in the *Book of the Dead*, which presents concepts of death and resurrection, numerous scenes of domestic life give an extraordinarily fine view of all aspects of Egyptian agriculture, viticulture, and oenology. We find in the papyri that large amounts of beer and wine were poured as sacred [104] libations at the time of a death or upon the completion of a monument. The same kind of information is codified in numerous tomb paintings. During the Middle Kingdom and thereafter, every vase, chair, musical instrument, sarcophagus, textile, and weaving contained information concerning either daily life or the afterlife. Most of this was in the form of depictions, and, even in the absence of a Rosetta stone and hieroglyphic understanding, there is a great deal that we could comprehend regarding all thirty dynasties.

One product that is often neglected in discussions of ancient Egypt is oil from crops of the castor bean (*Ricinus communis*). Olive oil was imported, as the tree was not grown there successfully until the Ptolemaic period. Alternative oils for commercial use were the fruit oils of the moringa tree (*Moringa drouhardi*), linseed oil from seeds of *Linum*, oil from the balanos tree (*Balanites aegyptiaca*) as well as sesame and saffron oils. Castor oil was especially important in that, when mixed with natron, it produced a smokeless flame that could be used in homes for lighting and in tombs to allow painters to produce murals. Alternative light sources would have covered the extraordinary art with a coating of soot.

Considerable debate exists over the probability of the opium poppy existing in early dynastic Egypt as well as in Assyria. Gabra (1956) suggested that the word *shepen* refers to poppy and *shepenen* to the opium poppy. These words appear in most medical papyri and in some papyri devoted to magic, notably the *Ebers Papyrus*. Those who argue against a number of "exotics" in early Egypt must take into account that from the late pre-dynastic period, trade in timber and numerous other commodities was accomplished by intercourse with the Levant and the montane regions of Lebanon. Also, as early as the fifth dynasty, expeditions to Punt are recorded, and we have reason to believe that these originated at an even earlier date. While the "land of Punt" has never been firmly located, we know from commodities such as sandalwood, ebony, giraffes, baboons, ivory, leopard skin, and gold that the area or region was most certainly a part of the Somaliland coast. Harbors and ships for import were stationed along the Red Sea. Donkeys brought items of barter from Nubia to the south as far as equatorial Africa. The tomb of Ramses II, 1304-1237 B.C., presents us with a complete depiction of tributes that came from conquered Nubia and places south.

It is a temptation for the ethnobotanist to find psychoactive plants in early dynastic Egypt, and to that end many have tried to place *Cannabis* in this context. The contention that *smsm t*, mentioned in both the *Berlin Papyrus* and *Ebers Papyrus*, corresponds to *Cannabis* is highly unlikely. No mummy has been found wrapped in hemp fiber; no rope from the base of *Cannabis* exists in Egypt from this period. No residues of hashish have been found in any lipid matrices from funerary jars or unguent containers. It was not until the third century A.D., when the Roman emperor Aurelian imposed a tax on an Egyptian fiber, that we can identify hemp. The same may be said for Babylonia (unless one accepts the Waterman thesis advanced in 1930 that *qu-nu-bu*, mentioned during the reign of Esarhaddon in circa 680 B.C., is translatable as *Cannabis*).

By contrast, Gabra (1956) identified opiates in a residue from an "unguent vessel" of the eighteenth dynasty. Both the narcotic *Mandragora autumnalis*, *M. vernalis*, and fruits of *Papaver somniferum* figure in tomb paintings and

vessels of early dynasties and become quite common by the eighteenth dynasty (Emboden 1979). These are found in frequent conjunction with the sacred blue water lily of the Nile marshes, *Nymphaea caerulea*, which has been determined to have narcotic properties much as do its relatives *N. alba*, *N. ampla*, and the related *Nuphar lutea*. The union of three genera, all psychoactive and all involved in a healing presentation, is to be seen in the colored limestone intaglio of Meritaton and Semenkhar.

The full exegesis of psychoactive plants in the context of dynastic Egypt is discussed by Emboden (1979, 1981). The argument is made that these plants and their psychoactive constituents were adjuncts to the state of ecstasis among the priestly castes of ancient [105] Egypt and that they lead us to a very new way of viewing Egyptian art and artifacts, as well as those of other ancient civilizations. A limestone relief of the Amarna period circa 1350 B.C. shows us the healing of King Semenkhar by his consort Meritaton using *Mandragora* and *Nymphaea*; this is a fine example of the specific context of these plants. These plant motifs appear again in the eighteenth dynasty portrait of [Tutankhamen on his throne with his queen](#). [Figure 4. Throne chair of Tutankhamen (Post Amarna) depicting his queen healing him using *Mandragora* and *Nymphaea*. Cairo Museum.]

One bit of iconography that still puzzles Egyptologists is the depiction of "Lady Tuth-Shena" on the stela in which she is before the god Horus. Emanating from the sun disc on Horus's head are five "rays" of tubular flowers that strongly suggest *Datura*.

Figure 5. Tuth-Shena in awe of the god Horus, who emits rays of *Datura* from the sun disc on his head.



Since *Datura* is pantemperate and pantropical, the genus could not be considered scarce in any region. It is also a genus with easily identifiable virtues. It has been used in every area in which it is known, in rites of passage and in diverse forms of shamanism. Its psychoactive properties are extraordinary, and one of the usual modalities in the *Datura* experience is that of mystical flight, an out-of-the-body sensation.

This explanation, like so many others relating to Tuth-Shena and Horus, might seem specious were it not for the other, associated plants that have psychoactive properties: the central flower and leaf of *Nymphaea caerulea*; at the foot of Horus, the unguent jar wrapped with the narcotic water lily bud; the strand of grapes and their leaves hanging from the opposite side of the supporting pedestal upon which offerings rest; the four repeated [106] representations of a cleft water lily leaf in the series of glyphs at the right-hand margin. It is the realm of the dead, evidenced by the resin cone on the head of Tuth-Shena. The light is the light of Horus, realized in the psychoactive flowers of *Datura* which "illuminate" Tuth-Shena in allegorical fashion. It is the power of Horus before which she throws up her hands in awe. *Vitis*, *Nymphaea*, and *Datura* are the intoxicating elements portrayed in this scene of shamanic manifestation.

It is perhaps by coincidence that the frequency of portrayal of psychogenic plants is correlated with the level of development of ancient civilizations, but I do not think so. A shamanic caste appears and, subsequently, there is further shamanic stratification, the adjuncts to these priestly offices—that is to say, psychoactive plants—increase. The length of the associated rituals is progressively increased, and the litanies or magical incantations become hypertrophied. We can see the same thing among the Maya. It parallels the complexity of medicine and medicinal practices, for all these are inseparable at a certain level. They are manifestations of belief systems that are enhanced by altered states of consciousness.

In conclusion, rather than to try to elucidate the complexity of ancient agricultural practices, it may be more appropriate to comment on certain categories of plants important to a settled state of existence, and on the inclusion of greater numbers of plants with psychoactive properties as a civilization evolves. The best place to find these plant species may not be in cuneiform script or in the hieroglyphics of papyri, but in the art and artifacts of the civilization. This is especially necessary for the ancient Near East, where ethnobotanical evaluation has been virtually absent.

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Gods and Plants in the Classical World

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[131] In cult and myth, many of the gods of the classical world are associated with particular plants. Athena, it was said, discovered the olive as her special tree. The laurel was sacred to Apollo, supposedly as the metamorphosis of the nymph Daphne, who had fled to avoid his amorous embrace. Demeter's chosen gift to the human race was the cultivated sheaf of grain; of equal value, it was thought, was Dionysus's gift of the vine.

Behind these common assignments lies a long tradition of cultural evolution from earlier times when the plants that were the gods' botanical attributes originally had chemical properties that made the plants more than symbolic entheogens; these properties made the plants function psychoactively in rites of shamanism. Thus, even in the classical age, Demeter was still assigned the narcotic poppy, in addition to her sheaf of grain; and her secret barley drink at the Eleusinian Mystery actually induced a visionary experience for her initiates. So, too, Apollo's chemically innocuous laurel was still responsible, if only symbolically, for precipitating the ecstatic seizures of his clairvoyant priestess at the sanctuary of Delphi. And the wine produced from the grape vines of Dionysus was not only an alcoholic inebriant, but it was treated, in social and viticultural rites, as the very embodiment of the god's possessing spirit.

At the dawn of consciousness, we may surmise that humans, apart from the other beasts, recognized the inevitable death awaiting each one and the fearful dependence of the living upon the dead for nourishment and for the continuance of generations. Thus the first science was founded. Edible matter was distinguished from inedible matter, whether poisonous or not useful or taboo, and the earliest perceptions of religion were sensed through those medicinal and magical substances that seemed to mediate between this world and the worlds of the gods and ancestors. These entheogens varied with environment and cultural traditions: availability alone would not suffice to determine a plant's sanctity; meaningful connotations in mythology and religion were also necessary.

For those peoples who took up a settled way of life—tending herds, sowing crops, and founding towns—the dark entombment of the earth became their sacred place where the spirits dwelt. This was the womb into which the seed was entrusted. Earth was the great Mother, the goddess who was the end and the next beginning of all that lives. The darkness of this chthonic realm was mirrored by the recurrent cycles of the night, lighted by the lunar phases that uncannily seemed to correlate with womankind's rhythms. Opiates, the plants that induced an irrationality and a loss of conscious control, were the [132] pathway to Mother Earth's other world. Her special art was the discovery of how to manage the wastes produced by the continuous living of people and herds in the same place, without becoming poisoned by pollutants or famished by depletion of the land's fertility. Pollution had to be transmuted, both magically and in actual fact, into the fertilizing power that would renew Mother Earth for future generations.

In contrast to these settled peoples, nomadic peoples moved on, abandoning one location for another, and often not even burying their dead but hanging them from trees to free their spirits to the winds. Hunting and gathering required that nomadic peoples roam, migrating with the annual journey of the solar disc and seeking totemic kinship with the animals whose wild nature they would have to anticipate if they were to succeed in the hunt. Masculine strength determined precedence in the tribe, for whom god was masculine and the father. Appropriate to such a deity were wild plants, instead of cultivated ones, and his visionary realm was one of celestial enlightenment.

Such generic scenarios about earliest prehistory are misleading simplifications, although they are basically true, read back from mythological traditions and historical indications several millennia later. In what were to become the Greek lands, the Great Mother had already taken up residence, honored by the Minoans and other similar cultures, when the Indo-Europeans with their Great Father Zeus began arriving about the beginning of the second millennium B.C. By the middle of that millennium, the newcomers had taken over many of the previous settlements and assimilated their traditions with those of the earlier inhabitants.

At Mycenae, where modern archaeologists first uncovered traces of Indo-European civilization in Greece, the newcomers had imposed a kingship of their own style and they reinterpreted the name of the place to suit their own traditions. The word *Mycenae* is a feminine plural, like many names of Minoan settlements, which were named for the sisterhoods of the goddess's worshippers. In this case, the settlement was named after the Mycene girls, just as Thebes was named for the Thebe girls and Athens for the Athene girls. Even today the names of these towns are plurals grammatically. The Mycenaean Greeks, however, gave their town a false etymology, associating it with the tradition of the entheogen from their Asiatic homeland, the *mykes* or mushroom. Perseus, the city's refounder, had dynastic ties to another branch of the Indo-European migration, the Persians. Deposing the fearful Queen of the Gorgon sisterhood on the site of what was to become the new city, Perseus was said to have picked the sacred wild mushroom. By this act, Medusa, whose name means queen, lost her power to stupefy and was changed to celestial inspiration in the form of Zeus's daughter Athena and the flying horse Pegasus, who was responsible for numerous fountains, the drink of which liberated the soul for higher visions. In the same manner, Perseus's father, Zeus, would wield the lightning bolt as his weapon of enlightenment against the chthonic forces of darkness, planting, as it was supposed, the fungal entheogen wherever it fell to earth, as he took possession of the new Greek lands. The ensuing reconciliation of Minoans and Greek Mycenaeans would end up with the males in uneasy dominance over the females, but not without due allowance for some role for the traditions of the pre-Indo-Europeans.

The sacred mushroom of Zeus's people, as R. Gordon Wasson has shown, was the *Amanita muscaria*. The Indo-Europeans brought a remembrance of it wherever they migrated from their original home in the central Asian highlands. The Persians, for example, remembered it as *haoma*. Among the Hindus, it was *soma*.

With the passage of time, knowledge of the deity's original botanic identity was forgotten or restricted and substitutes or surrogates were employed, probably because the original was no longer easily obtainable in the new environments. The surrogates at first perpetuated certain attributes of the original, although they often were only symbolically [133] entheogenic. In some ways this perhaps even made these surrogates more appropriate, since the Indo-Europeans were prejudiced against ultimately admitting any corporeal or material component in the experience of spiritual enlightenment.

In India, the earliest surrogate was a mushroom lacking the chemical properties of the original mushroom but symbolically appropriate nonetheless; it functioned ritually as the transmutation of corporeal putrefaction into fragrant spiritual essence through the purifying agency of fire in the making of the Mahavira vessel for the Pravargya sacrifice.

Fungal surrogates are also found in Greek traditions. More often, the color of *Amanita muscaria* and its relatives is remembered, or the warty scabs from its ruptured membrane, or its wild unpredictable manner of growth, or its mycorrhizal associations with certain trees, or even the intoxication of its psychoactive urine constituent. Thus, the color of *Viola odorata* (or *ion* in Greek) made it sacred to the homonymously named Iamid dynasty of clairvoyant priests who replaced earlier priestesses at Olympia when the Indo-Europeans took over the goddess's sanctuary and rededicated it to their god Zeus. Probably, however, no chemically active entheogen was used in the divination practiced by these priests, who employed rational scientific methods of prognosis based on carefully observed omens, instead of the former irrational possession that had characterized the procedure previously.

The same botanic surrogate for the fungal entheogen occurs in the traditions about Apollo's secret son Ion, who was named for the violet and was begotten in a cave at Athens. No plants other than molds can be expected to grow in such a subterranean environment, but the Queen supposedly conceived the child there as she gathered the saffron-hued *Crocus saliva* in the company of her Athena sisterhood. This child of Apollo was instrumental

in shifting Athens from its previous traditions of matriliney to patriliney, as well as for purifying Apollo from the taint of female subservience, his role prior to assuming a new manifestation as a son of Zeus among the family of Olympians. It is Ion who lent his name, by a false etymology, to the "moving" electrical particle, a meaning that belies his former botanic fixity to Earth. This reinterpretation of his name was ancient and involved the myth of how he found a father, as well as his mother.

The luminous radiance of the sacred plant's color not only determined the violet and crocus as suitable surrogates for *Amanita*, but it appears to have been responsible also for the tawny hair that characterized Mycenaean princes such as Menelaus, Odysseus, and Achilles, as well as that of Apollo.

Animal surrogates also recall attributes of *Amanita*. The leopard that is sacred to Dionysus bears the warty scabs of the mushroom's ruptured membrane in the markings of its tawny pelt, and the antlered hind, an animal not found in Greece but from the Indo-European homeland, was sacred to Apollo's sister Artemis. The hind's fondness for *Amanita* and its constituents associates this animal with the entheogen in Siberian shamanism, and the golden antlers of the particular magical beast that belonged to Artemis suggest a botanical treelike surrogate of the appropriate color. Just as Perseus picked a mushroom in supplanting the religion of the goddess, Heracles numbered the plucking of these antlers among the labors he performed in claiming Greece for the religion of his father Zeus. In a similar manner, both Heracles and Perseus plucked golden apples from a sacred tree, just as another hero, Iason (or Jason), plucked the golden fleece. "Fleece" and "apple" are homonymous in Greek, and some traditions remembered that the original for what the heroes harvested from the trees was a mushroom.

The magical properties of the constituent are also recalled in the myth of the hunter Orion, one of several males who once were consorts of the goddess in the persona of Artemis, before she was assimilated to the Olympian family as a daughter of Zeus and twin sister of Apollo, who formerly also had been a version of her consort. Orion was killed for trying to rape a maiden like Artemis from the Indo-European homeland, but in [134] dying was transmuted into a celestial configuration as the constellation. In this newer identity it was claimed that Orion was a son of Zeus, who had inseminated Mother Earth with urine.

The Indo-European migrants, however, could not have failed to note the superior civilization of the Minoan peoples among whom they settled. That awareness, together with a tendency to equate the forward linear course of historical time with evolutionary progress, gave rise to the idea that the past is more primitive than the present and future. Hence, as new surrogates developed, the attributes of *Amanita* were also displaced upon the traditions of the previous inhabitants, equating all that was old as somehow inferior to newer manifestations in the Hellenic age that developed after the reconciliation of the two cultures. The people of the olden times, therefore, were sometimes themselves mushrooms or bore attributes of the entheogen from the original Indo-European homeland, even if in reality they must have been Minoans. At Corinth, for example, a town that also was resettled by the Mycenaean Greeks, the aboriginal populace was said to have been mushroom people before they were transformed into the new human inhabitants.

Settlements such as Mycenae and Athens were said to have been built by the Cyclopes, which were one of several versions of partial, maimed, or half figures in Greek mythology, all of them probably derived, like the one-legged man, from metaphors for *Amanita*. Each Cyclops had a single eye, suggesting the special vision afforded by the entheogen. The Cyclopes were associated with both chthonic and celestial shamanism. In the former, they tended the forge of the limping or one-legged Hephaestus in the heart of volcanoes, which were seen as a pathway to the underworld. In the later shamanic orientation, they were pressed into service of the new religion making Zeus's thunderbolts in that volcanic forge.

The same shift in orientation is represented in the encounter of the Cyclops named Polyphemus and the hero Odysseus. In the cave where Polyphemus is holding him captive, Odysseus introduces the monster to a new experience of intoxication with a powerful wine from Apollo. In escaping from Polyphemus, as in his other adventures, Odysseus is liberated from the chthonic realm to return to his homeland on the island Ithaca and to establish patriliney with his son Telemachus and father Laertes, in a place that during his absence had been in danger of becoming a queendom.

Other notorious half-men are the lame Oedipus, whose myth, like that of Ion, involves the discovery of paternity, and the one-shoed Iason, as well as Theseus, whose father's sandal was a clue that led to the hero's discovery of patriliny, and Achilles, whose heel was his only vulnerability. These lame figures probably derive originally from phallic symbolism of the Earth consort, reinterpreted through resemblance of *Amanita* to an erect phallus, for which common metaphors included the "single eye," the "lame third leg," the "little man," and so on. Sometimes the goddess even becomes involved with surrogates for the mushroom. Such is the case of the maiden (V)iole, who was responsible for the chthonic intoxication of Heracles and who bears the feminine version of Ion's name, with its reference to *Viola odorata*.

More often than through simple equation with primitivism, the Indo-European entheogen was thought to have undergone an essential hybridization from the wild plant of the Asiatic homeland (remembered as the realm of the Hyperboreans) into some cultivated substitute upon its importation and transplantation into the Mediterranean region. Thus the olive, which was supposed to have been discovered by Heracles in the Indo-European homeland, where it is not native, was transplanted to Greece and became the sacred emblem of Athena as daughter of Zeus, replacing her Minoan entheogen. It even became the symbol of Zeus at the Olympian games, after the Mycenaean Greeks took control of the sanctuary.

Among the earlier plants of Athena replaced by the olive was one the Greeks called [135] "horse-mad" or *hippomanes*, *Datura stramonium*, the thorn-apple or jimson weed. This chemically psychoactive entheogen was associated with Athena's primordial, pre-Olympian manifestation as a maddening Gorgon Medusa and it also is characteristic of the goddess in tantric traditions. Just as Athena came to symbolize the higher inspiration of the civilized arts of the Olympian Age, the olive was thought to be superior to its botanical avatar, for it is a cultivated tree, requiring constant pruning to keep it from reverting to the useless wild olive. At Athena's Panathenaic games in Athens, instead of a wreath of olive leaves, which was the prize at Olympia, the victorious athlete received an amphora of oil pressed from the sacred olive trees. This pressing of the surrogate fruit recalls the tradition of the original Indo-European entheogen, called in Vedic lore by the metaphor of the "pressed one," which is the meaning of the name *soma*. The olive was superior not only because it was cultivated whereas *Amanita* was wild, but also because it required the further intervention of scientific procedures of manufacture to release its food.

Athens claimed to have the first olive tree that ever grew, but the same claims was made elsewhere. On the island of Delos, where Apollo and Artemis were reborn into their Olympian identities, the aboriginal olive tree retained ritual connotations of the psychoactive original. In addition to the mock flagellation of pubescent dancers who chewed on its bark in commemoration of earlier times when they would have been sacrificial victims to the goddess, the identity of the Indo-European entheogen that supplanted the Minoan religion was maintained as restricted knowledge. Each year a secret offering of *Amanita* was supposed to have been transmitted through intermediaries from the Hyperborean homeland and presented among the offerings of first fruits sent to Delos from the various Greek cities. These first fruits were symbolic of primitivism, harvested early, before the full crop had ripened to maturity. Among these gifts, the secret offering from the Hyperboreans was the most primitive avatar of the agricultural arts.

Like the olive, Apollo's bay or laurel tree, *Laurus nobilis*, was similarly considered a sacred import or transplantation from the olden times in the traditions of the god's sanctuary at Delphi. It was used for the wreaths to crown victors in the Pythian games commemorating Apollo's triumph over his atavistic former identity at the site, where in pre-Indo-European times (i.e., before Apollo was reborn as a son of Zeus) the god had functioned in chthonic shamanism as a consort of Earth. The games at Delphi included musical and athletic competitions, celebrating contests of male physical superiority and, just as the games of Athena, the harmony of the higher artistic inspiration that dispels the discord of irrational, feminine possessing spirits.

Although the laurel retained the tradition of its psychoactive original in the shamanism of the Pythian priestess, it replaced more sinister plants formerly associated with the pre-Olympian manifestations of Apollo. One of these was aconite (*Aconitum*) or wolfsbane, a metaphoric name that goes back to the Greek nomenclature. Aconite is chemically psychoactive and its flowers, like those of *Viola*, mimic the sacred color of *Amanita*. This fortuitous resemblance facilitated the merging of the Indo-European god with his indigenous chthonic precedent. Wolfsbane or *lykoktonos* originated in the prophet-deity's cults, among the northern Hyperboreans and in what

was known as his other homeland among the so-called wolf-people, the matrilineal Lycians of Asia Minor. This wolf persona became characteristic not only of Apollo's darker nature, but also in general of the recidivous other self of all the heroes who were sons of Zeus. This lupine metaphor is a classical version of the werewolf mythologem and coincides with Indo-European versions of the same phenomenon. In Greek, the "wolf-madness" is rabies, the power of the she-wolf to cause the domestic dog to revert to its wild primordial ancestor. The Olympian Apollo was so dangerously unstable in his new identity that even dogs were excluded from his Delian sanctuary.

[136] Another of Apollo's botanical surrogates was *hyacinthos*, a plant name from the pre-Indo-European language. The Greeks identified it with larkspur, *Delphinium ajacis*, perhaps since the plant's medical efficacy against ectoparasites made it a fitting analogue to their own entheogen, *Amanita*, which has the property of making flies insensate and comatose, hence its common name, fly-agaric. The annual sacrificial victim offered to Apollo at the cliffs on the island of Leukas was similarly thought to rid the populace of an infestation of flies. The Minoan *hyacinthos* may have been a different plant, probably with psychoactive properties. It bears the name of a former version of Apollo, Hyacinthos, one of the many lamented males who were mourned as dying consorts of the goddess. Apollo, in the common mythological pattern of replacement, accidentally killed his own former persona in an incident of misdirected "wind" or inspiration. The plant's flowers were said to resemble the Greek letters for the cry of lament.

The bay tree or *daphne* replaced both the *hyacinthos* and the wolfsbane. The Pythian priestess prepared for her fit of shamanic possession by commemorating the maiden Daphne who was metamorphosed into the tree to avoid the god's courtship. She chewed the leaves of laurel and became possessed by the old, darker version of Apollo, but her shrieks of frenzied rapture were transformed into enigmatic Greek verses by a male priesthood, whose masculine role symbolically was to mediate with the female past traditions and reinterpret the senseless response coherently, as befitted the newer son of Zeus. The type of questions most often answered by the Delphic oracle was consistent with this general theme of reconciliation between female and male mentalities, just as the sanctuary itself mediated between a commemoration of the original chthonic religion and the traditions of the nomadic immigrants. In addition to common problems of marital infertility (and in mythological instances, of patriliney over matriliney), the oracle was often instrumental in advising Greek cities about where new colonizations of male-dominant Hellenic civilization might be settled upon the inhospitable Earth of Mother Nature, just as the wandering Apollo had no place to call his own until he took control of Delphi.

Like the *daphne* and the olive, Poseidon's sacred plant, the celery (or what is commonly called "parsley" by classicists), *Apium graveolens*, apparently was also a chemically innocuous surrogate for a plant that originally functioned in the god's pre-Olympian religion. It, too, symbolized the triumph over the chthonic forces of primitivism. Celery was used to crown the victors in Poseidon's games at Isthmia and Nemea, sanctuaries like Delphi and Olympia that evolved from shamanic rites practiced before the coming of the Indo-Europeans. As at the other sites, the victors probably were once the sacrificial victims offered to the goddess and her consort. The celery, as a surrogate, retained its funeral connotations from those earlier times. Thus, wreaths of celery were used to adorn tombs in the classical age, and it was a homily to say that someone close to death was in need of such a chaplet.

The original entheogen may well have been the poisonous hemlock, *Conium maculatum*, which celery resembles, since hemlock was the drug employed in the classical age as a lethal potion to put criminals to death; because criminals were originally appropriate candidates for human sacrifice, the mode of execution betrays its ritual precedents. As "consort of Earth" (which is the meaning of Poseidon's name), the god in his pre-Olympian persona was a deity of death, linked with the Gorgon identity of Athena as his goddess. Thus, he, like Athena, had equine manifestations, in which form he united sexually with the Medusa.

It is, however, in the paired figures of Demeter and Dionysus that one can see most clearly the full complexity of the pattern involved in the reconciliation of the botanical and religious traditions of the Indo-Europeans and their indigenous predecessors in the Greek lands. These two deities represented the totality of human foodstuffs—Demeter, the dry, and Dionysus, the liquid. Both incorporate commemorations of their avatars in chthonic [137] shamanism, as well as of the fungal entheogen of the Indo-European tradition. For both deities, the evolutionary perspective placed a higher value on their cultivated manifestations in the Hellenic age, as compared to their

wilder, more primitive antecedents. As in other cultures, the mushroom proved to be the perfect archetypal mediating symbol. Its wildness could be tamed into cultivated hybrids, and its obvious phallic configuration could also be viewed as feminine, when the cap becomes concave upon further opening in ripeness. It grows from what looks like an egg within the earth, thus suggesting the idea of resurrection from the nether world, and it thereby in Greek lore had surrogates in various analogous bulb plants, like the crocus, the narcissus, and asphodel, the last being the flower that traditionally grew in the Elysian fields. The chthonic mushroom's sudden appearance after rainfall suggested some causal relationship with the bolt of lightning's point of impact from the celestial realm, hence the union of sky and earth.

Because of the rational bias of classical scholarship, there has been a reluctance to consider the role of entheogens in Greek religion, as though the few researchers who do were somehow imposing their own distorted ideas upon ancient society and "gods in a flowerpot." The fact that the Greeks worshipped Dionysus as a god of intoxication should alone refute any doubt that they recognized something numinous in the experience of chemically induced madness. It is not I, after all, who found a god in my wine cup.

As the Greeks saw it, there were two aspects to this state of altered consciousness caused by the drinking of wine. One was primarily effeminate, regressive, and irrational; the other, virile and inspired, with connotations of the higher arts and of the political and social institutions of their male-dominant culture. The former was the maenadism of the women who tended the god's chthonic avatars in the mountain wildernesses during the nonagricultural season; the latter, the *symposia* or "drinking parties" of the men in the city, where poetry about their mythological heritage was recited and the friendships and alliances, often basically homoerotic (and hence, excluding female) were formed that sustained the male-dominated culture. Whatever women were present at *symposia* belonged to the *hetaera* or prostitute class. They were trained in dancing, poetry, and intellectual arts, and, unlike females of the citizenry, they were adept at the lascivious sexual arousal of their male patrons—talents that would have been deemed threatening in wives and daughters. To this masculine aspect of intoxication belongs also the god's role in renewing cultural identity through the paedeutical function of the theater. In modern terms, the contrast is between the drunken brawl and a cocktail party.

Wine was recognized for what it is, basically a fungal surrogate of the "pressed one," the *soma* of the Vedic tradition. The fungal nature of fermentation was clearly observable and seemed to the ancients to be the same kind of process that occurs in cooking, whereby the raw and primitive is transformed into civilized cuisine, a process, moreover, that was thought to be a sort of putrefaction and, hence, like a resurrection from moldering matter. In fermentation, the wild, unpredictable growth of *Amanita* yielded to the civilizing arts to produce a superior inebriant.

Wine, as the drink of the new age, deposed the god's avatars, all of them from both the Indo-European and Minoan traditions, but as always in Greek religion, the deposed personae must not be dishonored. They were commemorated as part of the deity's total identity. Thus, his previous names were still maintained—like Bacchus for Dionysus—or earlier iconography was perpetuated—like the Gorgon's head that Athena wears as a breastplate, a trophy of her former persona as goddess.

So, too, wine as an intoxicant was not solely the product of the grape's fermentation, but various herbal precedents were part of its "bouquet." Among these was resin, commemorating earlier ferments from the sap of trees that were host to *Amanita*; the pine tree became sacred to Dionysus, and modern Greek wine perpetuates this association as *retsina*. Many of the entheogens sacred to the goddess also found their way into this [138] ancient drink that was a symbolic recapitulatory synthesis of the two cultures' reconciliation, as well as an inebriant. Some of these additives were chemically psychoactive and so intensified the wine's toxicity that it could be drunk safely and properly only when greatly diluted with water. It was all of these that gave wine its "spirit," the ghosts of its constituent gods.

Alcohol itself was a substance unknown to the Greeks, who had no name for it. Our modern term comes from Arabic, where it first was described as the distillates of minerals for cosmetics, thence applied to the liquid distillate of ferments when it was first discovered much later by the alchemists as *aqua vitae*. The Greek word for wine itself, (*w*)*oinos*, appears to be Indo-European, and since viticulture was not native to these people in the Asiatic homeland, it could not originally have described the vinous ferment but rather their own sacred drink.

They applied its name to the newer drink when they encountered it in the course of their southern migrations. Etymologically, it appears to be a metaphor for *Amanita* as a "circular rimmed wheel," which is a typical pictograph for the sacred mushroom in other cultures. Cognates for *woinos* in Latin and modern languages (*vinum*, *vin*, *vino*, *wein*, etc.) are, therefore, derived from the Indo-European verbal root and not assimilated, as one might expect, from whatever linguistic culture originated viticulture.

Symbolically, the vine plant was seen as a botanical evolution of a more primitive, related plant. This avatar was the ivy, *Hedera helix*. Without fermentation, the leaves and berries were reputed to derange the mind. Ivy had not yet succumbed to the hybridization that would culminate in its civilized descendent that, like the olive, through constant pruning and tending would yield its harvest of the succulent grape, instead of the supposedly poisonous tiny berries of its ancestor.

The two aspects of Dionysus, wine and its precedents, had to be commemorated in ritual as well. Thus, in addition to the *symposia* of the men, the female citizenry was periodically released from the strictures of their secluded and protected lives within the innermost quarters of their houses in the city and they took off for their mountain revels as maenads or "madwomen." They formed again into the ancient Minoan sisterhoods of the triform goddess and reverted to wild, uncivilized behavior, and they laid claim again to the dominant role that once was theirs and that now was denied them in their lives within the city.

On the mountains, these women hunted the pre-viticultural manifestations of the god's possessing spirit. Symbolic of this was the ivy. As emblem of their recidivous quest, they bore the Minoan symbol of the *thyrsos*. This was the herbalist's staff, the implement of those who gathered wild plants. It was composed of a fennel stalk stuffed with the leaves of ivy that supposedly they had found. Other plants from olden times also figured in their ritual hunt. Prominent among these was the symbolism of the opium poppy, a plant from the Minoan religion, although it could not be expected to be found actually growing on the mountain and in the wintertime of the revel.

Indo-European precedents also were involved in the symbolism, as is clear from the mythical traditions about the *thyrsos*. Prometheus was said to have first brought the fiery spirit of the celestial enlightenment from the heavens by stealing fire from the Olympians and hiding it in a fennel stalk. Celestial fire as a bolt of lightning, especially when concealed in the herbalist's *thyrsos*, recalls the supposed involvement of lightning in the generation of mushrooms. Prometheus was the creator of the human race and his role was the essential mediation between the chthonic realm of his own origins and the newer realm of the Olympians, whom he tricked into accepting the right of his human creatures to exist. It was he who taught humankind the ritual of the sacrificial meal, whereby the past undergoes transmutation to feed the ongoing evolutionary process. The myths about Prometheus and his brother's son Deucalion, moreover, portray the inception of a new [139] age of humans with the inauguration of the Olympian family of deities with the father Zeus at its head.

Animate surrogates of the primitive god also were objects of the symbolic hunt of the maenads. Such beasts were the leopard, with its suggestive spotted pelt, and burrowing animals, who made their lair in the womb of Mother Earth, like the prolific hare or the phallic serpent, the latter being a reptile with herbalist significance since it was supposed to amass the toxins for its poisonous bite from the plants it lived among. It was claimed that the maenads conducted this hunt without implements, like true primitives, and that like Mother Nature, what they found were their babies. When they caught their prey, they tore it to pieces with their bare hands and ate it raw, without the benefit of the civilizing culinary arts. Again, we are dealing with symbolic events, since it is hard to see how women untrained in hunting could have managed to capture animals barehanded or slaughter their own babies, when apparently the babies were not brought to the revel.

Like the herbalist witches of later times, who were accused of consorting with the devil, the maenads—these respectable ladies from the city—were said to engage in a wiled sexual romp with goatlike men, the ithyphallic satyrs. The brotherhood of satyrs represented the possessing spirit of the primordial Dionysus, since prime among the animal surrogates of the god was the goat. The goat was seen as the natural enemy of the plants tended in the vineyard, and the sacrifice of that animal was the appropriate offering to free Dionysus from his own former identity. The sacrificial meal of goat meat fed the new god and his worshippers in the city upon the

demise of his primitive nature, but in the mountain revel, the god reverted to his role of caprine consort of the goddess from the time before he had been remade into a son of Zeus.

This god of the maenadic revel was also sometimes a bull, remembering the symbolism of the goddess as bovine in Minoan religion. The Indo-European entheogen assimilated the taurine persona as well, as in the Vedic tradition, and the maenads beat upon tympani in their mountain rites to waken the bellowing of *Amanita* as it burst suddenly into fruit with the thunderous sound of an earthquake.

Although the cultivated gardens were dormant in this winter season, the mountains would bloom with the wild flowers that were the god's bulbous surrogates. The Dionysus of the vine had departed, acquiescing to his own demise at the time of the harvest, which was a sacrifice of himself offered for human salvation. The ritual slaughter of the grape had been accomplished like a funeral, accompanied by the lamenting music of flutes; and the harvesters, disguised as satyrs, had sought to blame the murder upon the resurgent atavistic powers that were about to seize control of the world upon the death of the civilized god. The masked harvesters had trod upon the grapes and pressed the bloodlike juice, channeling it into subterranean vats, where it would be entombed, like the god's corpse, and left to molder. As his body lay fermenting through the winter months, the whole world would enter upon its regressive phase. Even the ivy would leave off its trailing, prostrate manner of summertime growth and begin to exert its regained supremacy, growing upright now in sinister mimicry of its usurped hybrid. The version of Dionysus that now took over was his primordial role as the goddess's inseminator; the erect phallus alone was this god's sign. It was borne defiantly in rural carnival-like processions, and the irrepressible lust that it represented defied the accepted norms of civilized urban life.

This was the time when comedies originally were performed. The actors and choral dancers, costumed extravagantly as fantastic metaphors for the ithyphallus that was their prominent emblem, would hold the finger, as it were, up to the leaders of society. They would, in effect, overthrow the city as it was and remake it to the liking of their own baser instincts. Typical of the comic plot, the lower elements of society—or even women—would take control, and all that was sacred, including the Olympian gods, would have to yield. The unrestrained libido ruled the world.

[140] When the fermentation, however, was completed, at the threshold of spring, the wilder spirit of the god's avatars would have, in turn, to give way as the cultivated god triumphed over death and returned from the grave in the guise of a divinely newborn infant, repeating the age-old miracle of the rebirth of the goddess's former consort as her son. This was not the same child as in olden times. This new Dionysus of the Hellenic age was destined eventually to resurrect even his mother and elevate her, like the Assumption later of the Blessed Virgin, to the celestial realm.

Dionysus's triumph opened, as well, the gates of the nether world, like an earlier example of Christ, and with him from the grave returned the spirits of all the dear departed. This moment, when the new wine was first breached, was celebrated as a communal banquet attended by both the living and the dead. Special table manners were in effect for this feast to ensure the proper separation of ghostly corruption and human life. These included chewing buckthorn (*Rhamnus*) as a laxative to purge the body of its own pollution, and eating and drinking from separate facilities to keep the ghosts at a respectable distance. The myths that traced the etiology of this festival recalled the coming of a new age of humans after the great flood, the redemption from madness caused by female chthonic powers, and the shift from matriliney to patriliney.

The young children of the citizenry were seen as manifestations of the infant god's miracle. At the age of three or four, the children would be indoctrinated into the metaphysical meaning of the wine as they drank it for their first experience of inebriation. We see these drunken children depicted on vase paintings as they play among the gravestones or impersonate their elders in performing various Dionysian rituals, such as the pole dance and the sacred marriage.

This symbolic renewal of the world was the context originally for the god's other type of drama, his tragedies, which would be performed at the contests held later in the spring, although the popularity of these festivals was so great that the distinction was soon blurred, so that both comedy and tragedy eventually were produced at each. Tragedy etymologically is the "goat song"; it was sung for the goat who was the sacrificial victim, the

honored primitive persona of the god, who had to fall before the ascendancy of his own better self. Typically, the plot of a tragedy presents a hero whose victory would endanger the fundamental stability of the Olympian order, and hence, the hero's failure is of greater value than his personal success. The choice, for example, is between an Oedipus or an Apollo, and the worlds that each represents.

In these festivals of drama, in which all the roles were enacted by men, we see a different kind of madness. Instead of the maenadic derangement of the women in the regressive mountain revel, the male actors channeled the experience of ghostly possession into a form that furthered the evolution of the norms of Hellenic culture.

The goddess Demeter underwent a similar reconciliation of her past botanic identities with her newer Hellenic and Olympian manifestation. As "Mother Deo," which is the meaning of her name, she was recognized by the arriving Indo-Europeans as the mother goddess, with one of her pre-Greek names, and she was assimilated into the Olympian family as a sister and mate of Zeus.

Another of Demeter's names from the Minoan tradition was Persephone. Since the latter, like Deo, is not Indo-European, it has no known etymology, but the Greeks could see in it the false meaning of "deadly." This version of the goddess was assimilated as Zeus's daughter by Demeter, and her myth depicts how, unlike her mother, she was denied Olympian status and relegated to the chthonic realm as a goddess of death and resurgent life from the nether house of her consort Hades.

Many were the plants sacred to the Demeter-Persephone duo: opiates, like the poppy, for which the wild rose later became a symbolic surrogate, by virtue of its similar flower and capsulelike hips, as did also the pomegranate, which it resembles; and deranging [141] herbs, like *Datura* and henbane (*Hyocyamus niger*), which was named in Greek for her sacred animal, the sow, a carnivorous beast that responds to the male scent of humans. By the classical age, henbane had become an abused drug by the younger generation.

As an Olympian, the goddess and her daughter were symbolized by the cultivated staff of barley. This was Demeter's antithesis to the wine of Dionysus. Hers was the dry stuff with which she nourished humankind, but like the vine, barley, too, had its atavistic precedent. This was seen as the wild and inedible weedy grass, *Lolium temulentum*, called "drunken lolium" in Latin botanic nomenclature because of the poisonous fungus (*Claviceps purpurea*) with which it is commonly infested. This fungus or ergot was called "rust" in Greek, as in English, because its reddening corruption overtakes the host kernels of grain in much the same way that the oxide of iron destroys the serviceable metal and seems to pull it back to the useless ore from which it had been manufactured. This same corruption seemed to spread from the weed to the cultivated grains, making them inedible like their ancestor. Barley, it was thought, would actually revert to lolium if it were not correctly tended to reinforce its evolutionary hybridization.

As with Dionysus, the fungus again was the ideal mediator. Grain, too, ferments, and the apparent putrefaction yields the leavening for the cooked loaf. The same triumph over atavism was seen in the transmutation of offal and dead matter into the renewed fertility of the plowland, a miracle that was commemorated by the ritual slaughter of the sow, whose decomposed remains were spread upon the fields as manure. As the Indo-European migrants traveled through the grain-growing lands to the north and east on their way toward Greece, they apparently found an early surrogate for their sacred plant in the chemical properties of *Claviceps*, the color of which perpetuated the sanctity of the original entheogen, and from which, by simple water solution, a form of LSD (lysergic acid di-ethylamide) can be easily separated from the other poisonous alkaloids of the ergot.

In the celebration of the Eleusinian Mysteries, which derive from Minoan precedents but which, like the other great religions of the Hellenic age, reconcile the two traditions of chthonic and celestial shamanism, ergot was employed in a drink that induced a mystical vision. The worshippers gathered at a place sacred to the goddess, beside the entrance to a subterranean tunnel considered to be one of the gateways to the nether world. There, at the village of Eleusis, near Athens, in the cavernous great Hall of Initiation, the initiates drank the potion and experienced a spiritual journey together through that passageway into the chthonic other world and then returned resurrected with the goddess, who had borne a matrilineal son during her underworld sojourn. Because of this communal rebirth, the worshippers came to feel that death, as Paul was later to preach of the Christian mystery,

had lost its sting. Instead of some demonic horror, they saw that the Lord of Death, who was Persephone's son, was bound to them by ties of friendship and reciprocal hospitality in his and their own homesteads.

The initiates were sworn to secrecy under pain of death, but the myth that told of the founding of the religion was profane knowledge, including the part that listed the ingredients for the sacred potion. According to the myth, Persephone had been picking wild flowers on the frontier of this world, as queen among a maiden sisterhood, when she happened upon a particular plant, the *narkissos*. The plant's name, as we should expect, is pre-Greek, and hence its etymology is unknown, but the word was assimilated into Greek and its properties as a drug are responsible for its meaning as a "narcotic." This Minoan entheogen induced the spiritual possession that abducted Persephone to the nether world as a maenadic mate of Hades. At Eleusis, this abduction without the mother's consent was rectified by the elevation of the lost maiden to the rank of wedded wife and mother. This evolution from illicitly abducted maiden to legitimate wife culminated in the institution of the civilizing rites of agriculture. It is Persephone's mysterious son, under the name of Triptolemus, who teaches humankind the art of tending barley.

[142] The Eleusinian potion was a symbolic drink, like wine, tracing the transition from primitivism to culture and mediating the Indo-European and Minoan religious traditions. The identity of three ingredients was not restricted knowledge. These were pennyroyal (*Mentha pulegium*), water, and barley—none of which could have been chemically responsible for the mystery experience. The water is obviously the inert medium that binds the two plants, which represent the polarity that is reconciled through the vision provided by the mystery.

Pennyroyal is a pungent aromatic mint, a wild plant that in Greek botanical lore is reputed to be an aphrodisiac; the plant's fragrance, like perfume, had connotations for the Greeks of lascivious illicit sexuality rather than of matrimonial duty and fidelity. Pennyroyal is emblematic of Persephone's abduction and the ensuing wrath of her deserted mother Demeter, who could neither accept that her daughter be a concubine nor countenance losing her to a male's control.

Barley represents the antithesis. It is the cultivated plant, symbolic of Demeter's acceptance of the periodic separation from her daughter, just as the seed is entrusted to earth only as a temporary prelude to the renewal of life and the return of Persephone with her son. Demeter becomes reconciled to her own role in the celestial realm as an Olympian, while her former self, in the persona of her daughter Persephone, resides in the chthonic realm, bound to her by family ties and cyclical visitation.

The secret ingredient of the potion—the one that made it serviceable as an abused substance—was ergot. It mediates between the polarities of wild and cultivated and of the Minoan and Indo-European traditions of shamanism. *Amanita* has no seed and defies attempts to control its unpredictable growth, but the ergot that spreads from lolium to the kernels of barley, threatening to pull the cultivated foodstuff back into primitivism, produces what appears to be an enlarged purplish seed, as the fungal mycelia permeate its host. Under appropriate conditions, the ergot-infested kernel falls to earth and enters its fruiting stage, with mushroom bodies recognizable to the naked eye. *Claviceps* itself is poisonous, but through the intervention of civilizing technique, the entheogenic component is separated into the solution of the potion. Nor can we doubt the association of ergot with the goddess, since "Rust" was one of Demeter's names.

There were two levels to the mystery, hence the plural Eleusinian Mysteries. The Lesser Mystery took place in the maenadic winter and involved the tradition of Persephone's abduction. It ritualized the hunt for *Amanita* or its surrogates. Part of this ceremony was the Sacred Marriage, when the woman who portrayed the role of the Queen, from the old days when Athens was a queendom, performed some secret rite in which she was possessed spiritually by Dionysus in some "taurine" form.

The Greater Mystery occurred in the fall and was experienced by the whole body of the initiates. Instead of the narcosis of the past Minoan tradition of the *narkissos*, a brilliant light of visionary illumination is described as the experience in the darkened Hall of Initiation on the Mystery night, as LSD supplanted sleep with the enlightened sight it induced in the wakeful worshippers huddled within. Although still a chthonic religion of the two goddesses, the Indo-European tradition had accommodated it to its own celestial orientation.

The Eleusinian Mystery was the most prominent initiatory religion in the classical world, but there were others that struck a different balance between the claims of earth and heaven. Some were more chthonic; others, more celestial. In the mysteries of the Kabeiroi, for example, the sacred drink enrolled the initiates into a nether world brotherhood of primordial men. In contrast, the Orphics overemphasized the Indo-European aspiration to liberate the soul from its symbiotic dependence upon the body. Their supposed founder Orpheus inadvertently abandoned his Persephone-like bride permanently in the underworld, and taught his tribesmen to shun all sexual contact with women. His [143] followers sought to purify their bodies to attain eventually a totally spiritual existence through inhaling special herbal fumigations, like Olympians themselves, and through vegetarianism and dietary prohibitions.

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HASHISH IN ISLAM 9TH TO 18TH CENTURY

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CANNABIS was used as an intoxicant (*phang*) in India and Iran as far back as 1000 B.C.^{1,2} It was adopted in the Moslem Middle East 1,800 years later, two centuries after the death of the prophet Mohammed. Indeed, during his life time (A.D. 570-632), the use of cannabis preparations (known in the Middle East as hashish, which means "grass" in Arabic) was unknown. This might be the reason why the prophet did not explicitly forbid in the holy Koran intoxication by cannabis, although he proscribed that induced by fermented beverages (alcohol, wine, beer).

There is no evidence that the Arabs became familiar with the intoxicating properties of hashish before the ninth century. At that time, they had already conquered Iraq and Syria and swept eastward to the border of Persia and Central Asia and westward through Asia Minor, North Africa, and Spain. (It was in 752 that the relentless Muslim expansion was halted at Poitiers by the Frankish king Charles Martel.)

In the ninth century, well after the establishment in A.D. 750 of the splendid Abasside caliphate in Bagdad, noted for its universities, Arab scholars translated the Greek texts of Dioscorides and Galen, and became familiar with the medicinal properties of cannabis. One physician of the early 10th century, Ibn Wahshiyah, warned of possible complications resulting from use of hashish. In his book, *On Poisons*, he claimed that the plant extract might cause death when mixed with other drugs. Another physician, the Persian born al-Rhazes, counselled against over-prescribing cannabis.³ Traders travelling to Persia from India and Central Asia also may have spread knowledge of the plant's medicinal properties.

According to Rosenthal,⁴ it was not until late in the ninth century that

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the use of hashish as an intoxicant surfaced in Islam. Called hashish instead of *bhang*, the Hindu designation, it was first consumed by members of religious Persian and Iraqi sects located at the eastern periphery of the Islamic empire which bordered the central steppes where the plant had its origins. And there was little cultural opposition at first because the holy Koran, which formulates in detail all of the rules of daily Muslim living, does not forbid explicitly the consumption of cannabis, although it proscribes the use of fermented beverages. And around A.D. 1000 the Fatima King al-Hakim issued an edict prohibiting the sale of alcohol throughout Syria and Egypt,³ but did not ban cannabis.

In the 11th century a Turkish people, the Seljuk, captured Bagdad and assumed effective power, although they retained the Abassides as figure-heads. The use of hashish became popular in Islamic society and was frequently mentioned in its literature at the zenith of the power of the Seljuks, when they had made additional conquests and converts in the Middle East and at the same time fended off an invasion by the Crusaders.

The story of Hasan-I-Saban is familiar to many. He was an Ismaili fanatic leader who in 1090 founded in Persia the order of the Hashishiyans, often referred to in the West as "Assassins" because they murdered their political opponents. Marco Polo, the Venetian explorer, related how Hasan, "the old man of the mountain," snared young men and fed them a secret potion in the splendid gardens of his fortress, the Alamut. In this earthly paradise their main activity was to make love to sensuous women. This way Hasan kept his young followers under his spell and was able to send them on dangerous missions to assassinate his opponents. He promised the young men, "Upon your return, my angels shall bear you into paradise."

The question as to the nature of the potion given by Hasan was answered in 1818 by Silvester de Sacy,⁵ who believed that it was hashish and also that the name Assassins derived from the name of Hasan's followers: Hashishiyans. Many accept this interpretation, which has been used ever since to link the use of hashish with violent behavior. Although often quoted, it is not supported by historical evidence.

There is no doubt that the "old man on the mountain," Hasan, was the shrewd Ismaili leader of a group of religious fanatics who defended an impregnable mountain fortress on the Persian border. That he indoctrinated some of his loyal followers, the *fidai*, blindly to carry out his orders is also true. And those orders sometimes included assassinating Hasan's

enemies. Several Arab sultans as well as leaders of the Crusades were murdered by these terrorists of the 12th century. Among them was Conrad Marquis de Montferrat, assassinated by one of Hasan's followers who had penetrated the Crusaders' camp disguised as a monk. So feared was the old man that even Saladin, one of the most famous Muslim generals of his time, had to abandon his plan to storm the Alamut.

The only evidence that Hasan actually gave hashish to his followers, however, is Marco Polo's anecdotal report which vaguely mentions a potion but no drug by name. If the old man did dispense hashish, he must have used its euphoriant quality sparingly, just enough to give his devotees a preview of the joys of the paradise Mohammed had promised to the faithful who died in battle.

There is another explanation why the followers of Hasan were called Hashishiyah, a term which would seem to designate users of hashish, numerous at the time. According to Lewis,⁶ "the followers of Hasan were nicknamed '*Hashishiyah*' as an expression of contempt for their wild beliefs and extravagant behavior It was a derisive comment on their conduct rather than a description of their practices." Another source comments that "the reason for the choice of the term '*Hashishayah*' might have been to confer on the partisans of Hasan the low and disreputable character attributed by some scholars to hashish eaters rather than the actual devotion of Hasan's followers to the drug." It was a way to discredit them as well as hashish. In any event, the mention of the *Hashishiyah* reported in Arabic texts in 1125 indicates that the use of hashish was common enough at that time "so that it could appear in an official document and require no explanation whatever."⁴

"Thus the *nickname* ('*Hashishiyah*') and with it the extensive *use of hashish*, appear to have surfaced during the late eleventh century; both may have been promoted by the real or alleged use of cannabis by Hasan's devotees who were engaged in spreading a vast network of open and secret influence over the Muslim world, from Egypt to Iran and beyond."⁴

The other sect which used hashish during the 12th century, according to Arabic historians, was the Sufis, a mystical branch of Islam that first appeared at the end of the eighth century. The Arabs of Sufism ("wearers of wool") were dedicated to hours of fasting, prayer, and solitary meditation, stressed self-denial and shunned worldly pleasures. A story was told by al-Ukbari that cannabis was discovered by the religious leader Shaikh Haidar, a founder of the Haidari order of Sufis in Kharasan (northwest Iran and Afghanistan). Haidar lived in a monastery in the mountains of

Rama around A.D. 1200. While walking in the countryside in the midday heat, he discovered the divine properties of a plant that appeased hunger and thirst while giving joy. He told his disciples, "Almighty God has bestowed upon you by a special favor the virtues of this plant, which will dissipate the shadows that cloud your souls and will brighten your spirits." Haidar, like the Hindu priests 2,000 years before him, recommended that his followers conceal from the people the divine properties of this precious herb. But such secrets cannot be kept for centuries, and after his death his disciples extolled the wonderful qualities of the "magic" plant: "Abandon wine, take the cup of Haidar, this cup which has the fragrance of amber and sparkles like a green emerald." (Egyptian historian and Sufi-Critic, al-Maqrizi)⁷

While it is unlikely that Haidar discovered the mind-altering properties of cannabis, he might have developed a special recipe for consuming the plant. Even though the story of the old monk may be apocryphal, nonetheless, some of the Sufis did use hashish in their religious observances and spread its consumption throughout Islamic society,⁴ introducing it to Syria and Egypt.^{8,9} Most of the Sufis were recruited from among the poor, who could not afford wine, which, despite the Koranic ban, was abundantly used by the rich. Some Sufis claimed, as many Indian holy men had 20 centuries earlier, that the gentle herb expanded consciousness, brought insight, peace and repose, and closeness to God. Abel¹⁰ has compared the Sufis with the hippies of modern America and Haidar with Timothy Leary, and Haidari monasteries with communes. Both groups, it is true, used the drug to proselytize and claimed that it would contribute to individual enlightenment and self-improvement. The analogy is misleading, however, because the hippies and Leary did not belong to any formal religious group, and, in addition to cannabis, used many other drugs such as LSD to produce a chemically induced alteration of consciousness. Sufism was and still is the mystical, contemplative branch of Islam. Most Sufis then and now practiced asceticism and a drug-free life to reach a true mystical experience. All the great Sufi mystics and saints such as al-Kalahabhi, al-Bistami, al-Ghazzali, and al-Islami rejected the use of the psychoactive drugs, which they considered a diabolic perversion. Today the order comprises thousands of deeply serious and devout men and women in nearly every Islamic country. Of all Moslems, they are probably the most aloof and inaccessible to Europeans. They practice a strict ascetic discipline to cleanse body and soul.¹¹

The recorded histories of the *Hashishiyah* and of a deviant faction of

the Sufi sect clearly indicate an increase in cannabis use during the 12th century among religious sects located at the eastern periphery of the Arabic empire. During the same period that the Sufis introduced cannabis, along with opium, into Egypt at the end of the 12th century, alcohol production and sale was prohibited by the Ayubid King al-Afdal in Egypt and Syria. (Arab scientists had invented the alambic for the distillation of fermented beverages into alcohol.) But since there was no ban on cannabis cultivation or use, by the 13th century use of hashish had spread to the general population of the Islamic world and had gained converts in the West as well, from Egypt to Spain.

A 13th century Spanish botanist, Ibn Baitar, reporting on his trip to Egypt, describes the cultivation of "Konnab Indi" (*Cannabis indica*), which was called *hashish* by the local population. He noted that eating hashish, primarily by the Sufis for their religious devotions, produced intoxication, jocularity, and a dream-like state. He was the first scientist to remark that the drug also caused dementia.¹² He had little regard for the Sufis he met, referring to them as "men of the vilest class."

During the period that Ibn Baitar traveled through Egypt, the Mongols entered Persia in their westward attempt to overrun the Arab empire. For more than a century they spread terror and dislocation in the invaded areas. Baghdad was sacked in 1258. These fierce warriors were familiar with both cannabis and alcohol.^{13,14} In fact, some Arab historians (Ibn Taymiyah and al-Zarkoshi) blame the spread of hashish in the 13th century on the Mongol invasions.⁴ There is little evidence for such a contention, however, since the consumption of cannabis preceeded the Mongol invasions by many years. Still, by driving eastern refugees, many of them Sufis, to the urban areas of Egypt and Syria, the Mongols may in that way have contributed to the westward spread of hashish.⁴

In the middle of the 13th century, the Mameluks overthrew the Ayyubid dynasty in Syria and Egypt, thereby inaugurating a lengthy period of economic, social, and cultural decadence which coincided with widespread use of hashish among the common people. This somber period of Egyptian history (1250-1571) was followed by the ruthless domination of the Ottoman Empire, which lasted until 1804.

For centuries a privileged and dissolute Circassian or Turkish ruling class, alien to Egypt, exploited the indigenous agrarian laborers. Hashish consumption was common to oppressor and oppressed alike. The rulers took it to enhance their pleasure¹⁵ and the peasants to escape the dreariness of their daily lives.

Unfavorable social consequences probably accompanied the hashish habit, because early social reformers, some sultans and emirs of Persia, Turkey, and Egypt, tried repeatedly to reverse the trend toward cannabis abuse among their people.

THE SOCIAL ACCEPTANCE OF HASHISH USAGE IN ISLAM: POINT AND COUNTERPOINT

As the popularity of hashish increased, its widespread use was perceived as a threat to society by responsible political leaders. There had been little reaction from the authorities, Ayyubid or Mamluk, so long as hashish use was limited to some deviant Sufis, who represented only a small, unproductive fraction of the population. The rulers became alarmed when the drug began to affect all levels of society, including professionals and merchants, and they periodically attempted to curtail or to suppress its use not so much for moral or religious reasons as to protect the state. While they were able temporarily to decrease hashish consumption, they were never able to suppress it altogether despite their absolute political and religious power.

In Egypt the first measures aimed at curtailing hashish use were taken by the governor of Cairo during the last years of the Ayyubid dynasty. He ordered the destruction of all of the cannabis plants growing in the Kafur park, a favorite gathering place for drifters and other amateurs of hashish (as a poet of the time wrote, "The green plant which grows in the Garden of Kafur replaces in our hearts the effects of wine, old and generous"). A police detail uprooted and burned all the plants in huge bonfires, as they do today in northern California. But this isolated effort to curtail cultivation of hashish was short-lived, and cannabis plants, grown by local farmers eager to increase their incomes, reappeared on the outskirts of Cairo.

The founder of the Mameluk dynasty in Egypt, King al-Zahir Babar (1266-1275), who had defeated the Mongol invaders at Goliath's Well in Syria, made the next attempt to ban the use of cannabis. A devout Moslem, Babar might have had religious objections to hashish use. But, because of his campaigns against the Mongols, the drug's debilitating effect on his soldiers' mental and physical capacities concerned him most.³ Whereas his Ayyubid dynasty predecessors had only attempted to discourage hashish cultivation, in 1266 Babar embarked on a total ban of both cultivation and consumption. He did the same with wine. Fields

where the plant was cultivated were put to the torch, all taverns and brothels were closed, the sale of hashish and wine was outlawed, and all hashish users were penalized. A judge praised his efforts, "The devil has no desire to stay with us! You have prevented him from obtaining both wine and hashish. You have thus deprived him of his water and fodder."⁴

Babar's successor, al-Mansur Galawan, reversed this repressive policy against drugs and tried a liberal approach. He imposed an excise tax on the sale of hashish and wine. Although his new policy generated revenues, it also resulted in an increased alcohol and hashish consumption to such a degree that this liberal reformer was forced to reimpose prohibition to protect his society's future.³

In the Islamic world of the 14th century, the use of hashish became even more prevalent and spread along the East Coast of Africa and west to North Africa and Spain. The botanist Ibn Batuta, in his travels from Persia to East Africa (1348), reported that hashish was eaten by the people, sometimes even in the mosques. He also mentioned the use of alcohol among the Muslim upper classes.¹³ In Morocco hashish was called *kaif* (known as "kif" today) and was used in the religious ceremonies of the Sunusis sect.³ The drug was also openly consumed in Southern Spain until that country's reconquest by Isabella the Catholic and the re-establishment of the firm grip of the Roman Catholic Church.

Alarmed by the widespread use of the drug, the authorities periodically attempted to curtail its usage. At the turn of the 14th century, the Ayyubid Sultan Nizam-Ud-Din of Syria ordered cannabis plants uprooted and burned, and condemned hashish eaters to having their teeth extracted. But 25 years later hashish was again commonly used and discussed in public.⁸ In Egypt there were three renewed attempts to ban the drug: In 1324 the governor of Cairo confiscated and destroyed supplies of hashish and wine. Fifty years later (1376), according to al-Maqrizi,⁷ the amir Sudun Shaikuni issued the same orders as Ayyubid sultan Nizam. Once more, at the end of the century (1394), Egyptian authorities in Cairo decreed a ban on hashish use and a destruction of the plants. Although these vigorous attempts at curtailing or suppressing cannabis consumption were short-lived, they do indicate that the rulers felt its widespread use was damaging society. As Rosenthal states:⁴

Islamic society did not have to fear the potential harm that hashish was able by prolonged use to inflict upon individual users. Its most important problem, which called for action, was the cumulative effect produced by large numbers of addicts. The periods when secular authorities tried openly and energetically to

fight drug use were sporadic. They were not the result of a revival of religious fervor where doctrinal considerations determined the government's attitude. They reflected an acute fear that a potential social evil threatening the welfare of the state might eventually get out of hand.

Not all rulers were concerned. For instance, when the sultan of Bagdad retired with his retinue to Cairo in 1393 he used hashish publicly, creating severe criticism in Egyptian ruling circles. Their attitude and repeated attempts to ban cannabis cultivation indicate that, unlike their counterparts in Bagdad, Egyptian leaders did not accept the drug even though its use was prevalent among the people.

There were no other concerted government attempts at banning the drug after the 14th century. Not until the 19th century were repressive measures again tried. Hashish was widely used in the interval. Under the Mameluk rule, which was marked by factionalism, revolts, and repression, the historian al-Maqrizi took a dim view of hashish consumption which "is now eaten openly and discussed candidly in the streets of Cairo, especially among the poor who claim the drug helps them escape their miserable condition."⁶

In the early part of the 16th century the Mameluks were defeated by the Ottomans, and Syria and Egypt came under a new foreign rule. During the reign of Sulaiman the Great (1520-1566), the high point of the Ottoman empire, the historian al-Tunis (1550) noted that in Egypt the common people, following the lead of the wealthy class, sought intoxication by ingesting cannabis extracts. From then on, cannabis was considered to be "the grass of the poor" (*hashichat-oul-fouquar'a*). When European traders introduced tobacco smoking to the Ottoman empire (circa 1600), a habit the Turks believed immoral, harsh penalties were imposed to suppress it. As elsewhere in the world, the new habit caught on quickly. Tobacco was often smoked with hashish in a water pipe (*narguileh*), an Oriental invention. The old custom of ingesting hashish preparations continued unabated, especially among the poorer classes.

In his 16th century monograph, *De medicina Aegyptiorum*, Prosper Alpinus described hashish intoxication in Egypt. "For an hour afterwards, those who have taken it, display their madness, and remaining for a long time in a state of ecstasy, revel in their delightful dreams. This drug is a favorite for the common people because it is bought at a reasonable price."¹⁶

Cannabis use was not as prevalent in Turkey as in the Arabian provinces of the Ottoman empire, Syria, and Egypt. The ruling classes

adopted the habits of the conquered Greek and Armenian minorities, and used alcohol and wine preferentially, while the less fortunate had to be content with hashish. A 17th century historian, Eulogio Efendi, reports that in Constantinople there were more than 1,000 beer shops and 104 wine distributors but only 60 places where hashish was sold and smoked.

In the last part of the 17th century a French traveler, C. Sonnini, reported in his book *Travels in Egypt* (1790), the widespread consumption by the Arabs of potions made from hemp plants.

The Arabs are thrown into a sort of pleasing inebriety, a state of 'reverie' that inspires gaiety and at times agreeable dreams. This kind of annihilation of the faculty of thinking, this kind of slumber of the soul, bears no resemblance to the intoxication produced by wine or strong liquors, and the French language affords no terms by which it can be expressed. The Arabs give the name of *kif* to this voluptuous vacuity of mind, this sort of fascinating stupor.¹⁷

KIF IN THE OLD KINGDOM OF MOROCCO

After Egypt, Morocco is the North African country with the longest documented record of cannabis use. The drug is known there under the name of *kif*, which in Arabic means pleasure or well being and connotes dream and ecstasy.

The Spanish botanist, Ibn Baitar, who travelled through North Africa in the first part of the 13th century, reported that the use and cultivation of cannabis which was prevalent in Egypt was not seen in the rest of North Africa. The intoxicant was probably introduced into Morocco toward the end of the 13th century and spread from there to the Iberian Peninsula. At that time the power of the Cherifian kingdom of Morocco had reached its highest point. It had been founded five centuries before in 783 when Arab invaders reached the western tip of North Africa. The conquerors settled in the fertile coastal plains while the indigenous Berbers retired to the mountains of the Rif in the north and to the Atlas in the south, but only after having been converted to the Islamic faith.

The two populations which shared the same religion have kept until this day distinctive cultural, linguistic, and ethnic features. The successive dynasties of Moroccan kings dotted the country with three magnificent capitals: Rabat, Fez, and Marrakech, the latter founded in the 11th century in an oasis at the foot of high Atlas mountains, gave its name to the kingdom. In all three cities great mosques and palaces beautifully decorated testify to the achievements of a most civilized people.

The emergence of the use of *kif* in Morocco late in the 13th century

coincided with the start of a long period of quiescence which was also observed throughout the Moslem world until the modern era. The cannabis habit was adopted as elsewhere in Arab-dominated lands, creating the same controversies which we have previously described between the unswerving adepts of the weed and its determined detractors.

We have few records of this period during which Morocco, a self-sufficient nation, was cut off from the outside world and lived according to feudal, ancestral rules in a theocracy headed by a descendent of the prophet. The mariner and explorer, Thomas Pellow,¹⁸ reported that a ruler of Morocco, Muley Ali, lost his throne in 1736 as a result of his known addiction to hashish. Pellow also stated that cannabis was the next main crop after cereals. However, more recent reports indicate that cultivation of the plant was not widespread throughout the kingdom but limited to certain areas in the north, near the capital of Fez, in the provinces of Hoha and Shedma. Communication was very poor in this rugged land, and each valley had to remain self-sufficient.¹⁹

MEDICAL USE OF CANNABIS

During all these centuries cannabis continued to be used for medical purposes. Moslem physicians found more medicinal uses for cannabis than had been reported in the texts of Galen and Dioscorides. The physician al-Razi (865-925) refers to using hemp leaves as a medicament for the ear, and prescribes them for dandruff and for dissolving flatulence. He also describes their curative power in cases of epilepsy. Rumphius, a German botanist (A.D. 1100), describes in his herbarium the Moslem use of cannabis to treat asthma, gonorrhea, constipation, and as an antidote for poisoning. Other Arab physicians reported that hashish was used to stimulate the appetite (al-Badri, 1251) and produced a craving for sweets; others described it as "a beautiful music to the sense of hearing". Although it "opened the gates of desire",²⁰ prolonged use was believed to cut off the desire for sexual intercourse. A 17th century pharmacopeia of al-Intaqui prescribes cannabis for a large variety of somatic ailments and also mentions the euphoria and lethargy produced by the drug.

USE OF CANNABIS IN MOSLEM SOCIETY

Even though consumption of cannabis permeated Moslem society, the exact patterns of use are difficult to determine accurately. According to Rosenthal,⁴ "A certain class distinction was made between confirmed

addicts and the rest of the people. Hashish eaters were believed to be poor and low class people led by their habit to beggary (*harfasha*).'' Use of the drug ''generates low social rank (*safalah*) and a bad moral character (*radhalah*)'' and ''negates the existence of a well ordered society''. The evidence available indicates that the great consumers of hashish were the poor, uneducated peasants, and city laborers, as well as some learned Sufis and writers. Both groups intermingled, sharing their contempt for an establishment riddled with corruption. For them hashish was cheap and easily available even in the corner of every mosque. ''An ounce of hashish is more effective than pints of wine,'' claimed a poet. Since drinking wine was forbidden by the Prophet, use of a drug not mentioned by him and that was, besides, easy to conceal seemed less contemptible.

If the use of hashish appears to have carried a measure of social disapproval by the ruling class of sultans and caliphs, very little is known about the prevalence of hashish intoxication among their retinue and the lesser members of the establishment: civil servants and the military, the middle class, merchants, and craftsmen. Hashish was certainly used by many of them, although less blatantly than by the poor. Available texts indicate, however, that the moneyed classes preferred wine and alcohol to cannabis. As early as 1325 Ibn Batuta observed that alcohol use was a serious problem in the upper classes of Islam, who, despite the religious taboo, enjoyed wine. Most poets glorified the virtues of wine rather than those of hashish. ''Hashish poetry is little when compared to the abundance of verses on wine that were composed at all times'' writes Rosenthal.⁴

HASHISH AND THE ISLAMIC INTELLIGENTSIA

The extensive spread of cannabis use in Islam between the 13th and 16th centuries was accompanied by a spirited controversy among the intelligentsia that dwarfs the debate among American intellectuals of the last part of the 20th century. Moslem jurists, historians, theologians, poets, and storytellers discussed for centuries the merits and evils of the herb.

The controversy had its source in the fact that the holy Koran, the foundation of Moslem jurisprudence, does not mention hashish, while it does specifically forbid the use of *Khamr*, which has been interpreted as meaning wine as well as intoxicants.

O you who believe, Khamr, and gambling, dedication of stones and divination by arrows are an abomination of Satan. Therefore avoid them that you may prosper" (Sura Five verse 90)

"Satan's plan is to excite enmity and hatred among you with khamr and gambling, and to hinder you from the remembrance of God and his prayer will you not then abstain? (Sura Five verse 91)

The Koran also states: "Approach not prayers with a mind befogged not until you can understand all that you say." (Sura Five verse 44) Since Muslims must pray at regular intervals five times a day, the prohibition of praying while under the influence of intoxicants limits their use considerably.

At the time of the Prophet, *khamr* referred to wine, but during the three centuries which followed Mahomet's death Muslim legal scholars interpreted *khamr* as meaning any intoxicant that befogs the mind. "It is true that the word *khamr* is derived from the verb *khamara* which means to cover, or conceal and conveys the meaning of a substance which covers up the mind."²¹ The legal scholars' interpretation, however, did not correspond to popular usage, which still equated *khamr* with wine only. For many Muslims the ban against fermented beverages did not necessarily apply to hashish. Despite this disagreement, three of the four schools of Islamic law, Maliki, Shafi'i, and Hanbali, classified hashish as an intoxicant and finally outlawed its use by any true Sunni Muslim believer.

The fourth major legal school, however, the Hanafi, used the narrower definition of intoxicant. Hashish could be consumed in small quantities or for medical reasons. As stated by az-Zarkashi in 1360, "Any use of wine is forbidden because it is unclean, unlike hashish which is permitted but not for intoxication." Another jurist of Agfashi claimed in 1390 that, "Contrary to wine, hashish is used as medicine. It is not subject to punishment, and eating a small quantity of it is not forbidden as long as it does not influence the mind or senses."

The many pharmacological properties of cannabis and its prescription by Arab physicians for a large number of ailments influenced the Muslim jurists in their attitude toward the drug. If they were dealing with a useful medicine how could they pronounce a total ban of this substance like the one formulated by the Prophet against wine?

A respected Shafute legal scholar, Az-Zakarshi (1344-1392),²² remarked that the use of hashish could be considered lawful if it were consumed "for medical necessity to produce anesthesia for an amputation, and if consumed to still hunger," and the scholar added "if the user is immune to the intoxicating effect of hashish."

Possible physically and mentally harmful effects worried legal scholars because Moslem law does not permit self-destruction of the mind or body. But the argument that hashish permanently corrupted the mind and body could not be objectively proved.

The opinion of the Shak-al-Harin, expressed as early as the 13th century, prevailed: "All the destructive effects of wine are found in hashish many times over." The jurists were able to declare, "All orthodox Muslem religious authorities agree that a condition of stupor or exhilaration due to consumption of any substance which affects the mind is prohibited by Islam."²⁰

Even though the jurists were finally successful in arguing for the illegality of cannabis, they proved unsuccessful in devising effective ways to curtail its use. Their victory was a Pyrrhic one, and they had to be resigned to letting their people continue a habit over which religious law had no control because the problem had been debated too long and ignored by too many. The belief that the Prophet really had banned only alcohol became ingrained among the people.

HASHISH AND POETRY

Many writers and poets of the time extolled the marvelous properties of *bhāṅg* and hashish and defended their use. One example is the 11th century *Tales of the Thousand and One Nights*.²³ The author of the flying carpet might have himself experienced the feeling of levitation and flying resulting from cannabis intoxication. Other tales such as that of the "hashish eater" in the *hammam* (public bath) describe the more deceptive aspects of the drug which give rise to confusion of personal desire with hard reality. In another tale a religious leader, while exhorting the faithful at the mosque against the evil substance, drops some of his *bhāṅg* on the floor. He warns his listeners to keep away from the drug, only to recover it after they have left.¹⁶

The most vocal defender of hashish was al-Ukbari (1275) who, in "Thoughts in praise of the qualities of cannabis," wrote, "Know that the holy law has not indicated that the use of drugs that cause joy such as saffron or others similar to hashish is forbidden. No indication has come down from the Prophet that it is forbidden as such and no punishment has been established for eating it."²⁴

Two hundred years after al-Ukbari, al-Badri does not condemn the drug in his long treatise on hashish.²⁵ He mentions the low status of the hashish user "who gets to be hated by mankind," and has to swallow his drug and

keep silent. He also describes the close ties among users who may "share hashish with a goodly young man."

Although jurists had compared hashish and wine, their scholarly tests did not arouse much interest among the people. It was the Arab poets who caught popular fancy in their rhymes contrasting the "green one" (hashish) and the "red one" (wine).

One Syrian poet, al-Is-Irdis, who lived in the middle of the 13th century, summarized the respective merits of wine and hashish:

The secret of hashish lifts up the spirit
In an ascent of disembodied thinking.
It is pure spirit. Free are its confines
From worries. Only the elect may taste it.
Hashish involves no sin. You are not punished.
Their wine makes you forget all meanings. Our herb
Recalls the mysteries of godly beauty.
You can obtain the green stuff without haggling.
You do not need much gold and silver for it.
Tucked in a handkerchief it can be carried.
No cup is needed if you wish to use it.
You find yourself clean, virtuous and witty.
Bright too and free from all annoying dullness.
The body is not tired eliminating
And vomiting like an inflated wine skin.
In times both good and bad you may enjoy it.
It is no hindrance to nights of devotion.

After extolling the virtues of hashish, the same poet praises the qualities of wine as compared to the herb:

Would you by eating grass that is not juicy
Want to be like a dumb beast without reason?
Their herb brings shame upon a decent person
So that he slinks about just like a killer
Our wine brings honor to the lowly person
And dignity so none is his master
Unlike hashish, its qualities are useful
Speak out! Count and describe wine's many meanings!
No caliph surely ever tasted hashish.
Nor did a king in full command and power.
Whatever else but wine can tinge the hands that
Holding up a cup of wine reflect its color
When wine appears, the drinker's secret gets out
And gladdens him, his rosy cheek wine colored
Drink wine! Don't listen to censorious people
Though wine may be outlawed in our religion!⁴

The poet remains objective: Hashish is cheap, is not a sin; it confers to the user exalted spiritual experiences, while wine although illegal, is compatible with worldly power and decisive action. The hashish user belongs to the dregs of society. In subsequent verses the poet extolls the erotic power of both drugs. For wine: "Drunk, the beloved turns and bends down swaying Gracefully like the bent branch of a willow" For hashish: "Its virtues are all there when eating Hashish with a gazelle slender like a willow"

In another poem by the Syrian Ibn al-A'-ma (1292), hashish is judged infinitely superior to wine, which is unclean, used in the sacrilegious Christian rites, and illegal,

Give up wine and drink from the wine of Haydar
It is virginal, not deflowered by rain,
Nor has it ever been squeezed by feet or hands.
No Christian priest has ever played around with the
cup containing it,
Nor have they ever given communion from its cask to any
heretic's soul. Nothing has been said expressly by Malik to declare
it unlawful,
Nor is the *had* penalty for its use found prescribed.⁴

In later centuries poets continued to exalt the alleged virtues of hashish; ignoring the legal debate, they described the unique qualities of a drug which confers joy, repose, relief from worries, opens new vistas to the inquiring mind, broadens understanding, stimulates conviviality and fellowship, and enhances perception of music. These were features that also attracted the intelligentsia of the upper class to indulge in hashish use.

THE DAMAGING EFFECTS OF HASHISH

Disadvantages to use of the drug were reported. Scholars and physicians described the drug's mental and physical symptoms:

al-Zakarshi noted reddening of the eye, dryness of mouth, excessive sleeping and heaviness in the head when the drug takes possession of the brain, as well as numbness of the extremities. Prolonged use dries up the semen [already noted by Galen] and cuts off the desire for sexual intercourse, cuts short the reproductive capacity; brings forth hidden disease, harms the intestine, makes the limb inactive, causes a shortage of breath, diminishes vision in the eye and increases pensiveness in the imagination after initially causing joy; hashish produces narcosis, laziness, stupor, weakening sense perception, foul breath, and ruination of color and complexion. Hashish is mind changing and personality changing, causing insanity in the habitual user; changes the mind making it absent from reality.²²

Addiction was also observed: "Among the greatest physical harm caused by it is the fact that habitual users of it are hardly ever able to repent of it because of the effect it has upon their temper" says al-Zakarshi,²⁰ and al-Badri concurs:²² "The user cannot separate from it and leave it alone." In addition, the drug's adversaries continued to remark that hashish saps the user's energy, ability, and willingness to work. Implicitly, this was considered its greatest danger to the social fabric.

A CONCLUSION FOR OUR TIME

The medieval Arab world was one of the centers of civilization. In such fabulous cities as Persepolis, Bagdad, and Damascus an industrious population of traders and craftsmen thrived. They built elegant mosques and palaces, and financed famous universities where the best mathematicians, scientists, and scholars of the time could be found. Did hashish contribute to the fragmentation and decline of the brilliant Moslem empire as hinted by some historians?^{13,14} Such a decline cannot be attributed to any single cause but to many interacting factors that tend to erode man's creative energy and blunt the full exercise of his power. Among these, abuse of *cannabis*, the deceptive weed, with its promise of instant heaven on earth, cannot be excluded. Its widespread consumption may have oriented many citizens toward the self-centered, dreamy existence that was extolled by some of the intelligentsia but decried by many jurists and warriors.

When the Semitic tribes of the Arabic peninsula, moved by their Islamic faith, first conquered an empire greater than the Roman, cannabis was unknown. Gradually, however, cannabis began to permeate all levels of Moslem society and distracted many from the Prophet's long-term goal of establishing through conquest the true faith of Islam everywhere. This historical perspective has led Moslem leaders of today to side with orthodox Moslem scholars and attempt to curtail hashish use among their people.

Although many commercial and cultural contacts occurred after the 13th century, as a result of the Crusades, between the Arab world and the European nations lining the Mediterranean Sea, the use of cannabis as a pleasure-seeking, mind-altering drug did not spread to western Europe until the second part of the 20th century. Early Venetian traders and explorers brought back spices and incense, but not cannabis, from Turkish-dominated ports. This still held true when the major European powers

of the 17th and 18th centuries—France, Holland, and England—entered the colonial era and exerted direct control over large portions of Eastern, Middle Eastern, and African countries where cannabis intoxication was prevalent. There seemed to have been a cultural cleavage that kept the Europeans from adopting this Oriental habit. Representatives of the colonial powers continued to use their traditional pleasure-inducing substances. The British imported with them whiskey and sherry. The French brought along wine or planted vineyards, as they did in Algeria after the 1831 conquest.

The picture had changed completely by the middle of the 20th century following World War II. And today the similarity of the views and arguments of medieval Islam and the 20th century United States is striking. The debate on the pros and cons of marihuana and alcohol is every bit as heated^{26,27}. The same sort of claim (now amplified by the media) about the redeeming and beneficial effects of cannabis and the same strong statements about its harmful ones are heard. Little has changed except for one factor: today science has the ability to measure more objectively the properties and effects of the drug on the human mind and body. One question remains unanswered: Will this knowledge help Western man to preserve himself against his deep-seated desire for instant pleasure-reward and society against the damaging effect of cannabis abuse?²⁸

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ERRATA

In the October issue of the *Bulletin* (Volume 58, No. 7), page 641, the caption for the figure is as follows: Etchings of major characters in Shakespeare's plays by the artist John Hutton on the windows of the Nuffield Shakespeare Library in Stratford-on-Avon. Reading left to right, first row: Falstaff and Richard III, Bottom and Queen Titania, Cordelia and Lear. Second row: Portia and Shylock, Othello and Desdemona, Julius Caesar and Romeo and Juliet. Third row: Lord and Lady Macbeth, Antony and Cleopatra, and Ophelia and Hamlet.

The first line on page 641 has a misspelling of "Shakespearean." On page 643, nine lines from the bottom, there should be a comma after Bianca. On the same page, fourth line from the bottom, "his" should be "my" (Crowns in my purse).

On page 646, 11th line, the word "his" should precede "wife." On page 651, line 6, "seized" should be "seize."

FOLK-LORE OF PLANTS

BY T.F. THISELTON-DYER

1889

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Apart from botanical science, there is perhaps no subject of inquiry connected with plants of wider interest than that suggested by the study of folk-lore. This field of research has been largely worked of late years, and has obtained considerable popularity in this country, and on the Continent.

Much has already been written on the folk-lore of plants, a fact which has induced me to give, in the present volume, a brief systematic summary—with a few illustrations in each case—of the many branches into which the subject naturally subdivides itself. It is hoped, therefore, that this little work will serve as a useful handbook for those desirous of gaining some information, in a brief concise form, of the folk-lore which, in one form or another, has clustered round the vegetable kingdom.

T.F. THISELTON-DYER.

November 19, 1888.

CHAPTER I. PLANT LIFE.

The fact that plants, in common with man and the lower animals, possess the phenomena of life and death, naturally suggested in primitive times the notion of their having a similar kind of existence. In both cases there is a gradual development which is only reached by certain progressive stages of growth, a circumstance which was not without its practical lessons to the early naturalist.

This similarity, too, was held all the more striking when it was observed how the life of plants, like that of the higher organisms, was subject to disease, accident, and other hostile influences, and so liable at any moment to be cut off by an untimely end.^[1] On this account a personality was ascribed to the products of the vegetable kingdom, survivals of which are still of frequent occurrence at the present day. It was partly this conception which invested trees with that mystic or sacred character whereby they were regarded with a superstitious fear which found expression in sundry acts of sacrifice and worship. According to Mr. Tylor,^[2] there is reason to believe that, “the doctrine of the spirits of plants lay deep in the intellectual history of South-east Asia, but was in great measure superseded under Buddhist influence. The Buddhist books show that in the early days of their religion it was matter of controversy whether trees had souls, and therefore whether they might lawfully be injured.

Orthodox Buddhism decided against the tree souls, and consequently against the scruple to harm them, declaring trees to have no mind nor sentient principle, though admitting that certain dewas or spirits do reside in the body of trees, and speak from within them.” Anyhow, the notion of its being wrong to injure or mutilate a tree for fear of putting it to unnecessary pain was a widespread belief. Thus, the Ojibways imagined that trees had souls, and seldom cut them down, thinking that if they did so they would hear “the wailing of the trees when they suffered in this way.”^[3] In Sumatra^[4] certain trees have special honours paid to them as being the embodiment of the spirits of the woods, and the Fijians^[5] believe that “if an animal or a plant die, its soul immediately goes to Bolotoo.”

The Dayaks of Borneo^[6] assert that rice has a living principle or spirit, and hold feasts to retain its soul lest the crops should decay. And the Karens affirm,^[7] too, that plants as well as men and animals have their “la” or spirit. The Iroquois acknowledge the existence of spirits in trees and plants, and say that the spirit of corn, the spirit of beans, and the spirit of squashes are supposed to have the forms of three beautiful maidens. According to a tradition current among the Miamis, one year when there was an unusual abundance of corn, the spirit of the corn was very angry because the children had thrown corn-cobs at each other in play, pretending to have suffered serious bodily injury in consequence of their sport^[8].

Similarly, when the wind blows the long grass or waving corn, the German peasant will say, “the Grass-wolf,” or “the Corn-wolf” is abroad. According to Mr. Ralston, in some places, “the last sheaf of rye is left as a shelter to the *Roggenwolf* or Rye-wolf during the winter’s cold, and in many a summer or autumn festive rite that being is represented by a rustic, who assumes a wolf-like appearance. The corn spirit was, however, often symbolised under a human form.”

Indeed, under a variety of forms this animistic conception is found among the lower races, and in certain cases explains the strong prejudice to certain herbs as articles of food. The Society Islanders ascribed a “varua” or surviving soul to plants, and the negroes of Congo adored a sacred tree called “Mirrone,” one being generally planted near the house, as if it were the tutelary god of the dwelling. It is customary, also, to place calabashes of palm wine at the feet of these trees, in case they should be thirsty.

In modern folk-lore there are many curious survivals of this tree-soul doctrine. In Westphalia,^[9] the peasantry announce formally to the nearest oak any death that may have occurred in the family, and occasionally this formula is employed—“The master is dead, the master is dead.” Even recently, writes Sir John Lubbock^[10], an oak copse at Loch Siant, in the Isle of Skye, was held so sacred that no persons would venture to cut the smallest branch from it. The Wallachians, “have a superstition that every flower has a soul, and that the water-lily is the sinless and scentless flower of the lake, which blossoms at the gates of Paradise to judge the rest, and that she will inquire strictly what they have done with their odours.”^[11]

It is noteworthy, also, that the Indian belief which describes the holes in trees as doors through which the special spirits of those trees pass, reappears in the German superstition that the holes in the oak are the pathways for elves,^[12] and that various diseases may be cured by contact with these holes. Hence some trees are regarded

with special veneration—particularly the lime and pine^[13]—and persons of a superstitious turn of mind, “may often be seen carrying sickly children to a forest for the purpose of dragging them through such holes.”

This practice formerly prevailed in our own country, a well-known illustration of which we may quote from White's “History of Selborne:”

“In a farmyard near the middle of the village,” he writes, “stands at this day a row of pollard ashes, which by the seams and long cicatrices down their sides, manifestly show that in former times they had been cleft asunder. These trees, when young and flexible, were severed and held open by wedges, while ruptured children, stripped naked, were pushed through the apertures.”^[14]

In Somersetshire the superstition still lingers on, and in Cornwall the ceremony to be of value must be performed before sunrise; but the practice does not seem to have been confined to any special locality. It should also be added, as Mr. Conway^[15] has pointed out, that in all Saxon countries in the Middle Ages a hole formed by two branches of a tree growing together was esteemed of highly efficacious value.

On the other hand, we must not confound the spiritual vitality ascribed to trees with the animistic conception of their being inhabited by certain spirits, although, as Mr. Tylor^[16] remarks, it is difficult at times to distinguish between the two notions. Instances of these tree spirits lie thickly scattered throughout the folk-lore of most countries, survivals of which remain even amongst cultured races. It is interesting, moreover, to trace the same idea in Greek and Roman mythology.

Thus Ovid^[17] tells a beautiful story of Erisichthon's impious attack on the grove of Ceres, and it may be remembered how the Greek dryads and hamadryads had their life linked to a tree, and, “as this withers and dies, they themselves fall away and cease to be; any injury to bough or twig is felt as a wound, and a wholesale hewing down puts an end to them at once—a cry of anguish escapes them when the cruel axe comes near.”

In “Apollonius Rhodius” we find one of these hamadryads imploring a woodman to spare a tree to which her existence is attached:

“Loud through the air resounds the woodman's stroke,
When, lo! a voice breaks from the groaning oak,
'Spare, spare my life! a trembling virgin spare!
Oh, listen to the Hamadryad's prayer!
No longer let that fearful axe resound;
Preserve the tree to which my life is bound.
See, from the bark my blood in torrents flows;
I faint, I sink, I perish from your blows.”

Aubrey, referring to this old superstition, says:

“I cannot omit taking notice of the great misfortune in the family of the Earl of Winchelsea, who at Eastwell, in Kent, felled down a most curious grove of oaks, near his own noble seat, and gave the first blow with his own hands. Shortly after his countess died in her bed suddenly, and his eldest son, the Lord Maidstone, was killed at sea by a cannon bullet.”

Modern European folk-lore still provides us with a curious variety of these spirit-haunted trees, and hence when the alder is hewn, “it bleeds, weeps, and begins to speak.”^[18]

An old tree in the Rugaard forest must not be felled for an elf dwells within, and another, on the Heinzenberg, near Zell, “uttered a complaint when the woodman cut it down, for in it was our Lady, whose chapel now stands upon the spot.”^[19]

An Austrian Maerchen tells of a stately fir, in which there sits a fairy maiden waited on by dwarfs, rewarding the innocent and plaguing the guilty; and there is the German song of the maiden in the pine, whose bark the boy splits with a gold and silver horn. Stories again are circulated in Sweden, among the peasantry, of persons who by cutting a branch from a habitation tree have been struck with death.

Such a tree was the “klinta tall” in Westmanland, under which a mermaid was said to dwell. To this tree might occasionally be seen snow-white cattle driven up from the neighbouring lake across the meadows. Another Swedish legend tells us how, when a man was on the point of cutting down a juniper tree in a wood, a voice was heard from the ground, saying, “friend, hew me not.” But he gave another stroke, when to his horror blood gushed from the root^[20]. Then there is the Danish tradition^[21] relating to the lonely thorn, occasionally seen in a field, but which never grows larger. Trees of this kind are always bewitched, and care should be taken not to approach them in the night time, “as there comes a fiery wheel forth from the bush, which, if a person cannot escape from, will destroy him.”

In modern Greece certain trees have their “stichios,” a being which has been described as a spectre, a wandering soul, a vague phantom, sometimes invisible, at others assuming the most widely varied forms. It is further added that when a tree is “stichimonious” it is dangerous for a man, “to sleep beneath its shade, and the woodcutters employed to cut it down will lie upon the ground and hide themselves, motionless, and holding their breath, at the moment when it is about to fall, dreading lest the stichio at whose life the blow is aimed with each stroke of the axe, should avenge itself at the precise moment when it is dislodged.”^[22]

Turning to primitive ideas on this subject, Mr. Schoolcraft mentions an Indian tradition of a hollow tree, from the recesses of which there issued on a calm day a sound like the voice of a spirit. Hence it was considered to be the residence of some powerful spirit, and was accordingly deemed sacred. Among rude tribes trees of this kind are held sacred, it being forbidden to cut them.

Some of the Siamese in the same way offer cakes and rice to the trees before felling them, and the Talein of Burmah will pray to the spirit of the tree before they begin to cut the tree down^[23]. Likewise in the Australian bush demons whistle in the branches, and in a variety of other eccentric ways make their presence manifest—reminding us of Ariel's imprisonment.^[24]

“Into a cloven pine; within which rift
Imprison'd, thou didst painfully remain,
A dozen years; ...
... Where thou didst vent thy groans,
As fast as mill-wheels strike.”

Similarly Miss Emerson, in her “Indian Myths” (1884, p. 134), quotes the story of “The Two Branches”:

“One day there was a great noise in a tree under which Manabozho was taking a nap. It grew louder, and, at length exasperated, he leaped into the tree, caught the two branches whose war was the occasion of the din, and pulled them asunder. But with a spring on either hand, the two branches caught and pinioned Manabozho between them. Three days the god remained imprisoned, during which his outcries and lamentations were the subject of derision from every quarter—from the birds of the air, and from the animals of the woods and plains. To complete his sad case, the wolves ate the breakfast he had left beneath the tree. At length a good bear came to his rescue and released him, when the god disclosed his divine intuitions, for he returned home, and without delay beat his two wives.”

Furthermore, we are told of the West Indian tribes, how, if any person going through a wood perceived a motion in the trees which he regarded as supernatural, frightened at the prodigy, he would address himself to that tree which shook the most. But such trees, however, did not condescend to converse, but ordered him to go to a boie, or priest, who would order him to sacrifice to their new deity.^[25] From the same source we also learn^[26] how among savage tribes those plants that produce great terrors, excitement, or a lethargic state, are supposed to

contain a supernatural being. Hence in Peru, tobacco is known as the sacred herb, and from its invigorating effect superstitious veneration is paid to the weed.

Many other plants have similar respect shown to them, and are used as talismans. Poisonous plants, again, from their deadly properties, have been held in the same repute;^[27] and it is a very common practice among American Indians to hang a small bag containing poisonous herbs around the neck of a child, “as a talisman against diseases or attacks from wild beasts.” It is commonly supposed that a child so protected is proof against every hurtful influence, from the fact of its being under the protection of the special spirits associated with the plant it wears.

Again, closely allied to beliefs of this kind is the notion of plants as the habitation of the departing soul, founded on the old doctrine of transmigration. Hence, referring to bygone times, we are told by Empedocles that “there are two destinies for the souls of highest virtue—to pass either into trees or into the bodies of lions.”^[28]

Amongst the numerous illustrations of this mythological conception may be noticed the story told by Ovid,^[29] who relates how Baucis and Philemon were rewarded in this manner for their charity to Zeus, who came a poor wanderer to their home.

It appears that they not only lived to an extreme old age, but at the last were transformed into trees. Ovid, also, tells how the gods listened to the prayer of penitent Myrrha, and eventually turned her into a tree. Although, as Mr. Keary remarks, “she has lost understanding with her former shape, she still weeps, and the drops which fall from her bark (*i.e.*, the myrrh) preserve the story of their mistress, so that she will be forgotten in no age to come.”

The sisters of Phaethon, bewailing his death on the shores of Eridanus, were changed into poplars. We may, too, compare the story of Daphne and Syrinx, who, when they could no longer elude the pursuit of Apollo and Pan, change themselves into a laurel and a reed. In modern times, Tasso and Spenser have given us graphic pictures based on this primitive phase of belief; and it may be remembered how Dante passed through that leafless wood, in the bark of every tree of which was imprisoned a suicide. In German folk-lore^[30] the soul is supposed to take the form of a flower, as a lily or white rose; and according to a popular belief, one of these flowers appears on the chairs of those about to die.

In the same way, from the grave of one unjustly executed white lilies are said to spring as a token of the person's innocence; and from that of a maiden, three lilies which no one save her lover must gather. The sex, moreover, it may be noted, is kept up even in this species of metempsychosis^[31]. Thus, in a Servian folk-song, there grows out of the youth's body a green fir, out of the maiden's a red rose, which entwine together. Amongst further instances quoted by Grimm, we are told how, “a child carries home a bud which the angel had given him in the wood, when the rose blooms the child is dead. The Lay of Eunnifal makes a blackthorn shoot out of the bodies of slain heathens, a white flower by the heads of fallen Christians.”

It is to this notion that Shakespeare alludes in “Hamlet,” where Laertes wishes that violets may spring from the grave of Ophelia (v. I):

“Lay her in the earth,
And from her fair and unpolluted flesh
May violets spring.”

A passage which is almost identical to one in the “Satires” of Persius (i. 39):

“E tumulo fortunataque favilla,
Nascentur violae;”

And an idea, too, which Tennyson seems to have borrowed:

“And from his ashes may be made,
The violet of his native land.”

Again, in the well-known story of “Tristram and Ysonde,” a further reference occurs: “From his grave there grew an eglantine which twined about the statue, a marvel for all men to see; and though three times they cut it down, it grew again, and ever wound its arms about the image of the fair Ysonde^[32].” In the Scottish ballad of “Fair Margaret and Sweet William,” it is related—

“Out of her breast there sprang a rose,
And out of his a briar;
They grew till they grew unto the church top,
And there they tied in a true lovers' knot.”

The same idea has prevailed to a large extent among savage races. Thus, some of the North-Western Indians believed that those who died a natural death would be compelled to dwell among the branches of tall trees. The Brazilians have a mythological character called Mani—a child who died and was buried in the house of her mother. Soon a plant sprang out of the grave, which grew, flourished, and bore fruit. This plant, says Mr. Dorman,^[33] was the Mandioca, named from *Mani*, and *Oca*, house. By the Mexicans marigolds are known as “death-flowers,” from a legend that they sprang up on the ground stained by, “the life-blood of those who fell victims to the love of gold and cruelty of the early Spanish settlers in America.”

Among the Virginian tribes, too, red clover was supposed to have sprung from and to be coloured by the blood of the red men slain in battle, with which may be compared the well-known legend connected with the lily of the valley formerly current in St. Leonard's Forest, Sussex. It is reported to have sprung from the blood of St. Leonard, who once encountered a mighty worm, or “fire-drake,” in the forest, engaging with it for three successive days. Eventually the saint came off victorious, but not without being seriously wounded; and wherever his blood was shed there sprang up lilies of the valley in profusion. After the battle of Towton a certain kind of wild rose is reported to have sprung up in the field where the Yorkists and Lancastrians fell, only there to be found:

“There still wild roses growing,
Frail tokens of the fray;
And the hedgerow green bears witness
Of Towton field that day.”^[33]

In fact, there are numerous legends of this kind; and it may be remembered how Defoe, in his “Tour through Great Britain,” speaks of a certain camp called Barrow Hill, adding, “they say this was a Danish camp, and everything hereabout is attributed to the Danes, because of the neighbouring Daventry, which they suppose to be built by them. The road hereabouts too, being overgrown with Dane-weed, they fancy it sprung from the blood of Danes slain in battle, and that if cut upon a certain day in the year, it bleeds.”^[34]

Similarly, the red poppies which followed the ploughing of the field of Waterloo after the Duke of Wellington's victory were said to have sprung from the blood of the troops who fell during the engagement;^[35] and the fruit of the mulberry, which was originally white, tradition tells us became empurpled through human blood, a notion which in Germany explains the colour of the heather. Once more, the mandrake, according to a superstition current in France and Germany, sprang up where the presence of a criminal had polluted the ground, and hence the old belief that it was generally found near a gallows.

In Iceland it is commonly said that when innocent persons are put to death the sorb or mountain ash will spring up over their graves. Similar traditions cluster round numerous other plants, which, apart from being a revival of a very early primitive belief, form one of the prettiest chapters of our legendary tales. Although found under a variety of forms, and in some cases sadly corrupted from the dress they originally wore, yet in their main features they have not lost their individuality, but still retain their distinctive character.

In connection with the myths of plant life may be noticed that curious species of exotic plants, commonly known as “sensitive plants,” and which have generally attracted considerable interest from their irritability when touched. Shelley has immortalised this curious freak of plant life in his charming poem, wherein he relates how,

“The sensitive plant was the earliest,
Up-gathered into the bosom of rest;
A sweet child weary of its delight,
The feeblest and yet the favourite,
Cradled within the embrace of night.”

Who can wonder, on gazing at one of these wonderful plants, that primitive and uncultured tribes should have regarded such mysterious and inexplicable movements as indications of a distinct personal life. Hence, as Darwin in his “Movements of Plants” remarks: “why a touch, slight pressure, or any other irritant, such as electricity, heat, or the absorption of animal matter, should modify the turgescence of the affected cells in such a manner as to cause movement, we do not know. But a touch acts in this manner so often, and on such widely distinct plants, that the tendency seems to be a very general one; and, if beneficial, it might be increased to any extent.”

If, therefore, one of the most eminent of recent scientific botanists confessed his inability to explain this strange peculiarity, we may excuse the savage if he regard it as another proof of a distinct personality in plant life. Thus, some years ago, a correspondent of the *Botanical Register*, describing the toad orchis (*Megaclinium bufo*), amusingly spoke as follows of its eccentric movements: “Let the reader imagine a green snake to be pressed flat like a dried flower, and then to have a road of toads, or some such speckled reptiles, drawn up along the middle in single file, their backs set up, their forelegs sprawling right and left, and their mouths wide open, with a large purple tongue wagging about convulsively, and a pretty considerable approach will be gained to an idea of this plant, which, if Pythagoras had but known of it, would have rendered all arguments about the transmigration of souls superfluous.”

But, apart from the vein of jocularity running through these remarks, such striking vegetable phenomena are scientifically as great a puzzle to the botanist as their movements are to the savage, the latter regarding them as the outward visible expression of a real inward personal existence.

But, to quote another kind of sympathy between human beings and certain plants, the Cingalese have a notion that the cocoa-nut plant withers away when beyond the reach of a human voice, and that the vervain and borage will only thrive near man's dwellings. Once more, the South Sea Islanders affirm that the scent is the spirit of a flower, and that the dead may be sustained by their fragrance, they cover their newly-made graves with many a sweet smelling blossom.

Footnotes:

1. See Tylor's “Primitive Culture,” 1873, i. 474-5; also Dorman's “Primitive Superstitions,” 1881, p. 294.

2. “Primitive Culture,” i. 476-7.

3. Jones's “Ojibways,” p. 104.

4. Marsden's “History of Sumatra,” p. 301.

5. Mariner's “Tonga Islands,” ii. 137.

6. St. John, “Far East,” i. 187.

7. See Tylor's “Primitive Culture,” i. 475.

8. Dorman's "Primitive Superstitions," p. 294; also Schoolcraft's "Indian Tribes."
9. See Thorpe's "Northern Mythology," iii. 61.
10. "Origin of Civilisation," 1870, p. 192. See Leslie Forbes' "Early Races of Scotland," i. 171.
11. Folkard's "Plant-lore, Legends, and Lyrics," p. 463.
12. Conway's "Mystic Trees and Flowers," *Blackwood's Magazine*, 1870, p. 594.
13. Thorpe's "Northern Mythology," i. 212.
14. See Black's "Folk-Medicine."
15. "Mystic Trees and Flowers," p. 594.
16. "Primitive Culture," ii. 215.
17. *Metam.*, viii. 742-839; also Grimm's *Teut. Myth.*, 1883, ii. 953-4
18. Grimm's *Teut. Myth.*, ii. 653.
19. Quoted in Tylor's "Primitive Culture," ii. 221.
20. Thorpe's "Northern Mythology," ii. 72, 73.
21. *Ibid.*, p. 219.
22. "Superstitions of Modern Greece," by M. Le Baron d'Estournelles, in *Nineteenth Century*, April 1882, pp. 394, 395.
23. See Dorman's "Primitive Superstitions," p. 288.
24. "The Tempest," act i. sc. 2.
25. Dorman's "Primitive Superstitions," p. 288.
26. *Ibid.*, p. 295.
27. See chapter on Demonology.
28. See Keary's "Outlines of Primitive Belief," 1882, pp. 66-7.
29. *Metam.*, viii. 714:—
"Frondere Philemona Baucis,
Baucida conspexit senior frondere Philemon.
... 'Valeque,
O conjux!' dixere simul, simul abdita texit
Ora frutex."
30. Thorpe's "Northern Mythology," i. 290, iii. 271.
31. Grimm's "Teut. Mythology," ii. 827.

32. Cox and Jones' "Popular Romances of the Middle Ages," 1880, p. 139

33. Smith's "Brazil," p. 586; "Primitive Superstitions," p. 293.

34. See Folkard's "Plant-lore, Legends, and Lyrics," p. 524.

35. See the *Gardeners' Chronicle*, 1875, p. 315.

36. According to another legend, forget-me-nots sprang up.

CHAPTER II. PRIMITIVE AND SAVAGE NOTIONS RESPECTING PLANTS

The descent of the human race from a tree—however whimsical such a notion may seem—was a belief once received as sober fact, and even now-a-days can be traced amongst the traditions of many races.^[1] This primitive idea of man's creation probably originated in the myth of Yggdrasil, the Tree of the Universe,^[2] around which so much legendary lore has clustered, and for a full explanation of which an immense amount of learning has been expended, although the student of mythology has never yet been able to arrive at any definite solution on this deeply intricate subject. Without entering into the many theories proposed in connection with this mythical tree, it no doubt represented the life-giving forces of nature.

It is generally supposed to have been an ash tree, but, as Mr. Conway^[3] points out, "there is reason to think that through the confluence of traditions other sacred trees blended with it. Thus, while the ash bears no fruit, the Eddas describe the stars as the fruit of Yggdrasil."

Mr. Thorpe,^[4] again, considers it identical with the "Robur Jovis," or sacred oak of Geismar, destroyed by Boniface, and the Irminsul of the Saxons, the *Columna Universalis*, "the terrestrial tree of offerings, an emblem of the whole world." At any rate the tree of the world, and the greatest of all trees, has long been identified in the northern mythology as the ash tree,^[5] a fact which accounts for the weird character assigned to it amongst all the Teutonic and Scandinavian nations, frequent illustrations of which will occur in the present volume. Referring to the descent of man from the tree, we may quote the Edda, according to which all mankind are descended from the ash and the elm. The story runs that as Odhinn and his two brothers were journeying over the earth they discovered these two stocks "void of future," and breathed into them the power of life^[6]:

"Spirit they owned not,
Sense they had not,
Blood nor vigour,
Nor colour fair.
Spirit gave Odhinn,
Thought gave Hoenir,
Blood gave Lodr
And colour fair."

This notion of tree-descent appears to have been popularly believed in olden days in Italy and Greece, illustrations of which occur in the literature of that period. Thus Virgil writes in the *Aeneid*^[7]:

"These woods were first the seat of sylvan powers,
Of nymphs and fauns, and savage men who took
Their birth from trunks of trees and stubborn oak."

Romulus and Remus had been found under the famous *Ficus Ruminalis*, which seems to suggest a connection with a tree parentage. It is true, as Mr. Keary remarks,^[8] that, "in the legend which we have received it is in this instance only a case of finding; but if we could go back to an earlier tradition, we should probably see that the relation between the mythical times and the tree had been more intimate."

Juvenal, it may be remembered, gives a further allusion to tree descent in his sixth satire^[9]:

“For when the world was new, the race that broke
Unfathered, from the soil or opening oak,
Lived most unlike the men of later times.”

In Greece the oak as well as the ash was accounted a tree whence men had sprung; hence in the “Odyssey,” the disguised hero is asked to state his pedigree, since he must necessarily have one; “for,” says the interrogator, “belike you are not come of the oak told of in old times, nor of the rock.”^[10] Hesiod tells us how Jove made the third or brazen race out of ash trees, and Hesychius speaks of “the fruit of the ash the race of men.” Phoroneus, again, according to the Grecian legend, was born of the ash, and we know, too, how among the Greeks certain families kept up the idea of a tree parentage; the Pelopidae having been said to be descended from the plane. Among the Persians the Achaemenidae had the same tradition respecting the origin of their house.^[11]

From the numerous instances illustrative of tree-descent, it is evident, as Mr. Keary points out, that, “there was once a fuller meaning than metaphor in the language which spoke of the roots and branches of a family, or in such expressions as the pathetic “Ah, woe, beloved shoot!” of Euripides.”^[12] Furthermore, as he adds, “Even when the literal notion of the descent from a tree had been lost sight of, the close connection between the prosperity of the tribe and the life of its fetish was often strictly held. The village tree of the German races was originally a tribal tree, with whose existence the life of the village was involved; and when we read of Christian saints and confessors, that they made a point of cutting down these half idols, we cannot wonder at the rage they called forth, nor that they often paid the penalty of their courage.”

Similarly we can understand the veneration bestowed on the forest tree from associations of this kind.

Consequently, as it has been remarked,^[13] “At a time when rude beginnings were all that were of the builder's art, the human mind must have been roused to a higher devotion by the sight of lofty trees under an open sky, than it could feel inside the stunted structures reared by unskilled hands.

When long afterwards the architecture peculiar to the Teutonic reached its perfection, did it not in its boldest creations still aim at reproducing the soaring trees of the forest? Would not the abortion of miserably carved or chiselled images lag far behind the form of the god which the youthful imagination of antiquity pictured to itself throned on the bowery summit of a sacred tree.”

It has been asked whether the idea of the Yggdrasil and the tree-descent may not be connected with the “tree of life” of Genesis. Without, however, entering into a discussion on this complex point, it is worthy of note that in several of the primitive mythologies we find distinct counterparts of the biblical account of the tree of life; and it seems quite possible that these corrupt forms of the Mosaic history of creation may, in a measure, have suggested the conception of the world tree, and the descent of mankind from a tree. On this subject the late Mr. R.J. King^[14] has given us the following interesting remarks in his paper on “Sacred Trees and Flowers”:

“How far the religious systems of the great nations of antiquity were affected by the record of the creation and fall preserved in the opening chapters of Genesis, it is not, perhaps, possible to determine. There are certain points of resemblance which are at least remarkable, but which we may assign, if we please, either to independent tradition, or to a natural development of the earliest or primeval period. The trees of life and of knowledge are at once suggested by the mysterious sacred tree which appears in the most ancient sculptures and paintings of Egypt and Assyria, and in those of the remoter East. In the symbolism of these nations the sacred tree sometimes figures as a type of the universe, and represents the whole system of created things, but more frequently as a tree of life, by whose fruit the votaries of the gods (and in some cases the gods themselves) are nourished with divine strength, and are prepared for the joys of immortality. The most ancient types of this mystical tree of life are the date palm, the fig, and the pine or cedar.”

By way of illustration, it may be noted that the ancient Egyptians had their legend of the “Tree of Life”. It is mentioned in their sacred books that Osiris ordered the names of souls to be written on this tree of life, the fruit

of which made those who ate it become as gods.^[15] Among the most ancient traditions of the Hindoos is that of the tree of life—called Soma in Sanskrit—the juice of which imparted immortality; this marvellous tree being guarded by spirits. Coming down to later times, Virgil speaks of a sacred tree in a manner which Grimm^[16] considers highly suggestive of the Yggdrasil:

“Jove's own tree,
High as his topmost boughs to heaven ascend,
So low his roots to hell's dominions tend.”

As already mentioned, numerous legendary stories have become interwoven with the myth of the Yggdrasil, the following sacred one combining the idea of tree-descent. According to a *trouvere* of the thirteenth century,^[17] “The tree of life was, a thousand years after the sin of the first man, transplanted from the Garden of Eden to the Garden of Abraham, and an angel came from heaven to tell the patriarch that upon this tree should hang the freedom of mankind. But first from the same tree of life Jesus should be born, and in the following wise. First was to be born a knight, Fanouel, who, through the scent merely of the flower of that living tree, should be engendered in the womb of a virgin; and this knight again, without knowing woman, should give birth to St. Anne, the mother of the Virgin Mary. Both these wonders fell out as they were foretold. A virgin bore Fanouel by smelling the tree; and Fanouel having once come unawares to that tree of life, and cut a fruit from it, wiped his knife against his thigh, in which he inflicted a slight wound, and thus let in some of the juice. Presently his thigh began to swell, and eventually St. Anne was born therefrom.”

But turning to survivals of this form of animism among uncultured tribes, we may quote the Damaras, a South African race, with whom “a tree is supposed to be the universal progenitor, two of which divide the honour.”^[18] According to their creed, “In the beginning of things there was a tree, and out of this tree came Damaras, bushmen, oxen, and zebras. The Damaras lit a fire which frightened away the bushmen and the oxen, but the zebras remained.”

Hence it is that bushmen and wild beasts live together in all sorts of inaccessible places, while the Damaras and oxen possess the land. The tree gave birth to everything else that lives. The natives of the Philippines, writes Mr. Marsden in his “History of Sumatra,” have a curious tradition of tree-descent, and in accordance with their belief, “The world at first consisted only of sky and water, and between these two a glade; which, weary with flying about, and finding no place to rest, set the water at variance with the sky, which, in order to keep it in bounds, and that it should not get uppermost, loaded the water with a number of islands, in which the glade might settle and leave them at peace. Mankind, they said, sprang out of a large cane with two joints, that, floating about in the water, was at length thrown by the waves against the feet of the glade as it stood on shore, which opened it with its bill; the man came out of one joint, the woman out of the other. These were soon after married by the consent of their god, Bathala Meycapal, which caused the first trembling of the earth,^[19] and from thence are descended the different nations of the world.”

Several interesting instances are given by Mr. Dorman, who tells us how the natives about Saginaw had a tradition of a boy who sprang from a tree within which was buried one of their tribe. The founders of the Miztec monarchy are said to be descended from two majestic trees that stood in a gorge of the mountain of Apoala.

The Chiapanecas had a tradition that they sprang from the roots of a silk cotton tree; while the Zapotecas attributed their origin to trees, their cypresses and palms often receiving offerings of incense and other gifts. The Tamanaquas of South America have a tradition that the human race sprang from the fruits of the date palm after the Mexican age of water.^[20]

Again, our English nursery fable of the parsley-bed, in which little strangers are discovered, is perhaps, “A remnant of a fuller tradition, like that of the woodpecker among the Romans, and that of the stork among our Continental kinsmen.”^[21] Both these birds having had a mystic celebrity, the former as the fire-singing bird and guardian genius of children, the latter as the baby-bringer.^[22] In Saterland it is said “infants are fetched out of the cabbage,” and in the Walloon part of Belgium they are supposed “to make their appearance in the parson's

garden.” Once more, a hollow tree overhanging a pool is known in many places, both in North and South Germany, as the first abode of unborn infants, variations of this primitive belief being found in different localities. Similar stories are very numerous, and under various forms are found in the legendary lore and folk-tales of most countries.

Footnotes:

1. See Keary's "Outlines of Primitive Belief," 1882, pp. 62-3.
2. See Grimm's "Teutonic Mythology," 1883, ii. 796-800; *Quarterly Review*, cxiv. 224; Thorpe's "Northern Mythology," i. 154; "Asgard and the Gods," edited by W. S. W. Anson, 1822, pp. 26, 27.
3. *Fraser's Magazine*, 1870, p. 597.
4. "Northern Mythology," i. 154-5.
5. See Max Miller's "Chips from a German Workshop."
6. See Keary's "Outlines of Primitive Belief," p. 64.
7. Book viii. p. 314.
8. "Outlines of Primitive Belief," p. 63.
9. Gifford.
10. Kelly's "Indo-European Folk-lore," p. 143.
11. Keary's "Outlines of Primitive Belief," p. 63; Fiske, "Myth and Myth Makers," 1873, pp. 64-5.
12. "Primitive Belief," p. 65.
13. Grimm's "Teutonic Mythology," i. 69.
14. *Quarterly Review*, 1863, cxiv. 214-15.
15. See Bunsen's "The Keys of St Peter," &c., 1867, p. 414.
16. "Teutonic Mythology."
17. Quoted by Mr. Keary from Leroux de Lincy, "Le Livre des Legendes," p. 24.
18. Gallon's "South Africa," p. 188.
19. "Primitive Superstitions," p. 289.
20. Folkard's "Plant Lore," p. 311.
21. "Indo-European Folk-lore," p. 92.
22. Grimm's "Teutonic Mythology," ii. 672-3.

CHAPTER III. PLANT-WORSHIP.

A form of religion which seems to have been widely-distributed amongst most races of mankind at a certain stage of their mental culture is plant-worship. Hence it holds a prominent place in the history of primitive belief, and at the present day prevails largely among rude and uncivilised races, survivals of which even linger on in our own country. To trace back the history of plant-worship would necessitate an inquiry into the origin and development of the nature-worshipping phase of religious belief. Such a subject of research would introduce us to those pre-historic days when human intelligence had succeeded only in selecting for worship the grand and imposing objects of sight and sense. Hence, as Mr. Keary observes,^[1] “The gods of the early world are the rock and the mountain, the tree, the river, the sea;” and Mr. Fergusson^[2] is of opinion that tree-worship, in association with serpent-worship, must be reckoned as the primitive faith of mankind.

In the previous chapter we have already pointed out how the animistic theory which invested the tree and grove with a conscious personality accounts for much of the worship and homage originally ascribed to them—identified, too, as they were later on, with the habitations of certain spirits. Whether viewed, therefore, in the light of past or modern inquiry, we find scattered throughout most countries various phases of plant-worship, a striking proof of its universality in days gone by.^[3]

According to Mr. Fergusson, tree-worship has sprung from a perception of the beauty and utility of trees. “With all their poetry,” he argues, “and all their usefulness, we can hardly feel astonished that the primitive races of mankind should have considered trees as the choicest gifts of the gods to men, and should have believed that their spirits still delighted to dwell among their branches, or spoke oracles through the rustling of their leaves.”

But Mr. McLennan^[4] does not consider that this is conclusive, adding that such a view of the subject, “Does not at all meet the case of the shrubs, creepers, marsh-plants, and weeds that have been worshipped.” He would rather connect it with Totemism,^[5] urging that the primitive stages of religious evolution go to show that, “The ancient nations came, in pre-historic times, through the Totem stage, having animals, and plants, and the heavenly bodies conceived as animals, for gods before the anthropomorphic gods appeared;” While Mr. Herbert Spencer^[6] again considers that, “Plant-worship, like the worship of idols and animals, is an aberrant species of ancestor-worship—a species somewhat more disguised externally, but having the same internal nature.”

Anyhow the subject is one concerning which the comparative mythologist has, at different times, drawn opposite theories; but of this there can be no doubt, that plant-worship was a primitive faith of mankind, a fact in connection with which we may quote Sir John Lubbock's words,^[7] how, “By man in this stage of progress everything was regarded as having life, and being more or less a deity.” Indeed, sacred rivers appear in the very earliest mythologies which have been recovered, and lingered among the last vestiges of heathenism long after the advent of a purer creed. As, too, it has been remarked,^[8] “Either as direct objects of worship, or as forming the temple under whose solemn shadow other and remoter deities might be adored, there is no part of the world in which trees have not been regarded with especial reverence.

'In such green palaces the first kings reigned;
Slept in their shade, and angels entertained.
With such old counsellors they did advise,
And by frequenting sacred shades grew wise.'

Even Paradise itself, says Evelyn, was but a kind of 'nemorous temple or sacred grove,' planted by God himself, and given to man *tanquam primo sacerdoti*; and he goes on to suggest that the groves which the patriarchs are recorded to have planted in different parts of Palestine may have been memorials of that first tree-shaded paradise from which Adam was expelled.”

Briefly noticing the antecedent history of plant-worship, it would seem to have lain at the foundation of the old Celtic creed, although few records on this point have come down to us.^[9] At any rate we have abundant evidence that this form of belief held a prominent place in the religion of these people, allusions to which are given by many of the early classical writers. Thus the very name of Druidism is a proof of the Celtic addiction to

tree-worship, and De Brosses,^[10] as a further evidence that this was so, would derive the word kirk, now softened into church, from *quercus*, an oak; that species having been peculiarly sacred. Similarly, in reviewing the old Teutonic beliefs, we come across the same references to tree-worship, in many respects displaying little or no distinction from that of the Celts. In explanation of this circumstance, Mr. Keary^[11] suggests that, “The nature of the Teutonic beliefs would apply, with only some slight changes, to the creed of the predecessors of the Germans in Northern and Western Europe. Undoubtedly, in prehistoric days, the Germans and Celts merged so much one into the other that their histories cannot well be distinguished.”

Mr. Fergusson in his elaborate researches has traced many indications of tree-adoration in Germany, noticing their continuance in the Christian period, as proved by Grimm, whose opinion is that, “the festal universal religion of the people had its abode in woods,” while the Christmas tree of present German celebration in all families is “almost undoubtedly a remnant of the tree-worship of their ancestors.”

According to Mr. Fergusson, one of the last and best-known examples of the veneration of groves and trees by the Germans after their conversion to Christianity, is that of the “Stock am Eisen” in Vienna, “The sacred tree into which every apprentice, down to recent times, before setting out on his “Wanderjahre”, drove a nail for luck. It now stands in the centre of that great capital, the last remaining vestige of the sacred grove, round which the city has grown up, and in sight of the proud cathedral, which has superseded and replaced its more venerable shade.”

Equally undoubted is the evidence of tree-worship in Greece—particular trees having been sacred to many of the gods. Thus we have the oak tree or beech of Jupiter, the laurel of Apollo, the vine of Bacchus. The olive is the well-known tree of Minerva. The myrtle was sacred to Aphrodite, and the apple of the Hesperides belonged to Juno.^[12] As a writer too in the *Edinburgh Review* ^[13] remarks, “The oak grove at Dodona is sufficiently evident to all classic readers to need no detailed mention of its oracles, or its highly sacred character.

The sacrifice of Agamemnon in Aulis, as told in the opening of the 'Iliad,' connects the tree and serpent worship together, and the wood of the sacred plane tree under which the sacrifice was made was preserved in the temple of Diana as a holy relic so late, according to Pausanias, as the second century of the Christian era.” The same writer further adds that in Italy traces of tree-worship, if not so distinct and prominent as in Greece, are nevertheless existent. Romulus, for instance, is described as hanging the arms and weapons of Acron, King of Cenina, upon an oak tree held sacred by the people, which became the site of the famous temple of Jupiter.

Then, again, turning to Bible history,^[14] the denunciations of tree-worship are very frequent and minute, not only in connection with the worship of Baal, but as mentioned in 2 Kings ix.: “And they (the children of Israel) set themselves up images and groves in every high hill, and under every green tree.” These acts, it has been remarked, “may be attributable more to heretical idolatrous practices into which the Jews had temporarily fallen in imitation of the heathen around them, but at the same time they furnish ample proof of the existence of tree and grove worship by the heathen nations of Syria as one of their most solemn rites.” But, from the period of King Hezekiah down to the Christian era, Mr. Fergusson finds no traces of tree-worship in Judea.

In Assyria tree-worship was a common form of idolatrous veneration, as proved by Lord Aberdeen's black-stone, and many of the plates in the works of Layard and Botta.^[15] Turning to India, tree-worship probably has always belonged to Aryan Hinduism, and as tree-worship did not belong to the aboriginal races of India, and was not adopted from them, “it must have formed part of the pantheistic worship of the Vedic system which endowed all created things with a spirit and life—a doctrine which modern Hinduism largely extended^[16].”

Thus when food is cooked, an oblation is made by the Hindu to trees, with an appropriate invocation before the food is eaten. The Bo tree is extensively worshipped in India, and the Toolsee plant (Basil) is held sacred to all gods—no oblation being considered sacred without its leaves. Certain of the Chittagong hill tribes worship the bamboo,^[17] and Sir John Lubbock, quoting from Thompson's “Travels in the Himalaya,” tells us that in the Simla hills the *Cupressus toridosa* is regarded as a sacred tree. Further instances might be enumerated, so general is this form of religious belief.

In an interesting and valuable paper by a Bengal civilian—intimately acquainted with the country and people^[18]—the writer says:—“The contrast between the acknowledged hatred of trees as a rule by the Bygas,^[19] and their deep veneration for certain others in particular, is very curious. I have seen the hillsides swept clear of forests for miles with but here and there a solitary tree left standing. These remain now the objects of the deepest veneration. So far from being injured they are carefully preserved, and receive offerings of food, clothes, and flowers from the passing Bygas, who firmly believe that tree to be the home of a spirit.” To give another illustration^[20], it appears that in Beerbhoom once a year the whole capital repairs to a shrine in the jungle, and makes simple offerings to a ghost who dwells in the Bela tree. The shrine consists of three trees—a Bela tree on the left, in which the ghost resides, and which is marked at the foot with blood; in the middle is a Kachmula tree, and on the right a Saura tree. In spite of the trees being at least seventy years old, the common people claim the greatest antiquity for the shrine, and tradition says that the three trees that now mark the spot neither grow thicker nor increase in height, but remain the same for ever.

A few years ago Dr. George Birwood contributed to the *Athenaeum* some interesting remarks on Persian flower-worship. Speaking of the Victoria Gardens at Bombay, he says:—“A true Persian in flowing robe of blue, and on his head his sheep-skin hat—black, glossy, curled, the fleece of Kar-Kal—would saunter in, and stand and meditate over every flower he saw, and always as if half in vision. And when the vision was fulfilled, and the ideal flower he was seeking found, he would spread his mat and sit before it until the setting of the sun, and then pray before it, and fold up his mat again and go home.

And the next night, and night after night, until that particular flower faded away, he would return to it, and bring his friends in ever-increasing troops to it, and sit and play the guitar or lute before it, and they would all together pray there, and after prayer still sit before it sipping sherbet, and talking the most hilarious and shocking scandal, late into the moonlight; and so again and again every evening until the flower died. Sometimes, by way of a grand finale, the whole company would suddenly rise before the flower and serenade it, together with an ode from Hafiz, and depart.”

Tree-worship too has been more or less prevalent among the American Indians, abundant illustrations of which have been given by travellers at different periods. In many cases a striking similarity is noticeable, showing a common origin, a circumstance which is important to the student of comparative mythology when tracing the distribution of religious beliefs.

The Dacotahs worship the medicine-wood, so called from a belief that it was a genius which protected or punished them according to their merits or demerits.^[21] Darwin^[22] mentions a tree near Siena de la Ventana to which the Indians paid homage as the altar of Walleechu; offerings of cigars, bread, and meat having been suspended upon it by threads. The tree was surrounded by bleached bones of horses that had been sacrificed. Mr. Tylor^[23] speaks of an ancient cypress existing in Mexico, which he thus describes:—“All over its branches were fastened votive offerings of the Indians, hundreds of locks of coarse black hair, teeth, bits of coloured cloth, rags, and morsels of ribbon. The tree was many centuries old, and had probably had some mysterious influence ascribed to it, and been decorated with such simple offerings long before the discovery of America.”

Once more, the Calchaquis of Brazil^[24] have been in the habit of worshipping certain trees which were frequently decorated by the Indians with feathers; and Charlevoix narrates another interesting instance of tree-worship:—“Formerly the Indians in the neighbourhood of Acadia had in their country, near the sea-shore, a tree extremely ancient, of which they relate many wonders, and which was always laden with offerings. After the sea had laid open its whole root, it then supported itself a long time almost in the air against the violence of the winds and waves, which confirmed those Indians in the notion that the tree must be the abode of some powerful spirit; nor was its fall even capable of undeceiving them, so that as long as the smallest part of its branches appeared above the water, they paid it the same honours as whilst it stood.”

In North America, according to Franklin,^[25] the Crees used to hang strips of buffalo flesh and pieces of cloth on their sacred tree; and in Nicaragua maize and beans were worshipped. By the natives of Carolina the tea-plant was formerly held in veneration above all other plants, and indeed similar phases of superstition are very

numerous. Traces of tree-worship occur in Africa, and Sir John Lubbock^[26] mentions the sacred groves of the Marghi—a dense part of the forest surrounded with a ditch—where in the most luxuriant and widest spreading tree their god, Zumbri, is worshipped. In his valuable work on Ceylon, Sir J. Emerson Tennent gives some interesting details about the consecration of trees to different demons to insure their safety, and of the ceremonies performed by the kattadias or devil-priests.

It appears that whenever the assistance of a devil-dancer is required in extreme cases of sickness, various formalities are observed after the following fashion. An altar is erected, profusely adorned with garlands and flowers, within sight of the dying man, who is ordered to touch and dedicate to the evil spirit the wild flowers, rice, and flesh laid upon it.

Traces of plant-worship are still found in Europe. Before sunrise on Good Friday the Bohemians are in the habit of going into their gardens, and after falling on their knees before a tree, to say, “I pray, O green tree, that God may make thee good,” a formula which Mr. Ralston^[27] considers has probably been altered under the influence of Christianity “from a direct prayer to the tree to a prayer for it.” At night they run about the garden exclaiming, “Bud, O trees, bud! or I will flog you.” On the following day they shake the trees, and clank their keys, while the church bells are ringing, under the impression that the more noise they make the more fruit will they get. Traces, too, of tree-worship, adds Mr. Ralston,^[28] may be found in the song which the Russian girls sing as they go out into the woods to fetch the birch tree at Whitsuntide, and to gather flowers for wreaths and garlands:

“Rejoice not, oaks;
Rejoice not, green oaks.
Not to you go the maidens;
Not to you do they bring pies,
Cakes, omelettes.
So, so, Semik and Troitsa [Trinity]!
Rejoice, birch trees, rejoice, green ones!
To you go the maidens!
To you they bring pies,
Cakes, omelettes.”

The eatables here mentioned probably refer to the sacrifices offered in olden days to the birch—the tree of the spring. With this practice we may compare one long observed in our own country, and known as “wassailing.” At certain seasons it has long been customary in Devonshire for the farmer, on the eve of Twelfth-day, to go into the orchard after supper with a large milk pail of cider with roasted apples pressed into it. Out of this each person in the company takes what is called a clome—i.e., earthenware cup—full of liquor, and standing under the more fruitful apple trees, address them in these words:

“Health to thee, good apple tree,
Well to bear pocket fulls, hat fulls,
Peck fulls, bushel bag fulls.”

After the formula has been repeated, the contents of the cup are thrown at the trees.^[29] There are numerous allusions to this form of tree-worship in the literature of the past; and Tusser, among his many pieces of advice to the husbandman, has not omitted to remind him that he should,

“Wassail the trees, that they may bear
You many a plum and many a pear;
For more or less fruit they will bring,
As you do them wassailing.”

Survivals of this kind show how tenaciously old superstitious rites struggle for existence even when they have ceased to be recognised as worthy of belief.

Footnotes:

1. "Outlines of Primitive Belief," 1882, p. 54.
2. "Tree and Serpent Worship."
3. See Sir John Lubbock's "Origin of Civilisation," pp. 192-8.
4. *Fortnightly Review*, "The Worship of Animals and Plants," 1870, vii. 213.
5. *Ibid.*, 1869, vi. 408.
6. "Principles of Sociology," 1885, i. p. 359.
7. "The Origin of Civilisation and Primitive Condition of Man."
8. *Quarterly Review*, cxiv. 212.
9. Keary's "Primitive Brlief," pp. 332-3; *Edinburgh Review*, cxxx. 488-9.
10. "Du Culte des Dieux Fetiches," p. 169.
11. "Primitive Belief," pp. 332-3.
12. Fergusson's "Tree and Serpent Worship," p. 16.
13. cxxx. 492; see Tacitus' "Germania," ix.
14. See *Edinburgh Review*, cxxx. 490-1.
15. *Edinburgh Review*, cxxx. 491.
16. Mr. Fergusson's "Tree and Serpent Worship." See *Edinburgh Review*, cxxx. 498.
17. See Lewin's "Hill Tracts of Chittagong," p. 10.
18. *Cornhill Magazine*, November 1872, p. 598.
19. An important tribe in Central India.
20. See Sherring's "Sacred City of the Hindus," 1868, p. 89.
21. Dorman's "Primitive Superstitions," p. 291.
22. See "Researches in Geology and Natural History," p. 79.
23. "Anahuac," 215, 265.
24. Dorman's "Primitive Superstitions." p. 292.
25. "Journeys to the Polar Sea." i. 221.
26. "The Origin of Civilisation."

27. "Songs of the Russian People." p. 219.

28. *Ibid.*, p. 238.

29. See my "British Popular Customs." p. 21.

CHAPTER IV. LIGHTNING PLANTS.

Amongst the legends of the ancient world few subjects occupy a more prominent place than lightning, associated as it is with those myths of the origin of fire which are of such wide distribution.^[1] In examining these survivals of primitive culture we are confronted with some of the most elaborate problems of primeval philosophy, many of which are not only highly complicated, but have given rise to various conjectures. Thus, although it is easy to understand the reasons which led our ancestors, in their childlike ignorance, to speak of the lightning as a worm, serpent, trident, arrow, or forked wand, yet the contrary is the case when we inquire why it was occasionally symbolised as a flower or leaf, or when, as Mr. Fiske^[2] remarks, "we seek to ascertain why certain trees, such as the ash, hazel, white thorn, and mistletoe, were supposed to be in a certain sense embodiments of it."

Indeed, however satisfactory our explanations may apparently seem, in many cases they can only be regarded as ingenious theories based on the most probable theories which the science of comparative folk-lore may have suggested. In analysing, too, the evidence for determining the possible association of ideas which induced our primitive forefathers to form those mythical conceptions that we find embodied in the folk-tales of most races, it is necessary to unravel from the relics of the past the one common notion that underlies them.

Respecting the origin of fire, for instance, the leading idea—as handed down to us in myths of this kind—would make us believe that it was originally stolen. Stories which point to this conclusion are not limited to any one country, but are shared by races widely remote from one another. This circumstance is important, as helping to explain the relation of particular plants to lightning, and accounts for the superstitious reverence so frequently paid to them by most Aryan tribes. Hence, the way by which the Veda argues the existence of the palasa—a mystic tree with the Hindus—is founded on the following tradition:—The demons had stolen the heavenly soma, or drink of the gods, and cellared it in some mythical rock or cloud.

When the thirsty deities were pining for their much-prized liquor, the falcon undertook to restore it to them, although he succeeded at the cost of a claw and a plume, of which he was deprived by the graze of an arrow shot by one of the demons. Both fell to the earth and took root; the claw becoming a species of thorn, which Dr. Kuhn identifies as the "*Mimosa catechu*," and the feather a "palasa tree," which has a red sap and scarlet blossoms.

With such a divine origin—for the falcon was nothing less than a lightning god^[3]—the trees naturally were incorporations,^[4] "not only of the heavenly fire, but also of the soma, with which the claw and feather were impregnated."

It is not surprising, therefore, that extraordinary virtues were ascribed to these lightning plants, qualities which, in no small degree, distinguish their representatives at the present day. Thus we are told how in India the mimosa is known as the imperial tree on account of its remarkable properties, being credited as an efficacious charm against all sorts of malignant influences, such as the evil eye.

Not unlike in colour to the blossom of the Indian palasa are the red berries of the rowan or mountain-ash (*Pyrus aucuparia*), a tree which has acquired European renown from the Aryan tradition of its being an embodiment of the lightning from which it was sprung. It has acquired, therefore, a mystic character, evidences of which are numerous throughout Europe, where its leaves are revered as being the most potent talisman against the darker powers. At the present day we still find the Highland milkmaid carrying with her a rowan-cross against unforeseen danger, just as in many a German village twigs are put over stables to keep out witches. Illustrations of this kind support its widespread reputation for supernatural virtues, besides showing how closely allied is much of the folk-lore of our own with that of continental countries. At the same time, we feel inclined to agree with Mr. Farrer that the red berries of the mountain-ash probably singled it out from among trees for

worship long before our ancestors had arrived at any idea of abstract divinities. The beauty of its berries, added to their brilliant red colour, would naturally excite feelings of admiration and awe, and hence it would in process of time become invested with a sacred significance.

It must be remembered, too, that all over the world there is a regard for things red, this colour having been once held sacred to Thor, and Grimm suggests that it was on this account the robin acquired its sacred character. Similarly, the Highland women tie a piece of red worsted thread round their cows' tails previous to turning them out to grass for the first time in spring, for, in accordance with an old adage:

“Rowan-ash, and red thread,
Keep the devils from their speed.”

In the same way the mothers in Esthonia put some red thread in their babies' cradles as a preservative against danger, and in China something red is tied round children's wrists as a safeguard against evil spirits. By the aid of comparative folk-lore it is interesting, as in this case, to trace the same notion in different countries, although it is by no means possible to account for such undesigned resemblance. The common ash (*Fraxinus excelsior*), too, is a lightning plant, and, according to an old couplet:

“Avoid an ash,
It counts the flash.”

Another tree held sacred to Thor was the hazel (*Corylus avellana*), which, like the mountain-ash, was considered an actual embodiment of the lightning. Indeed, “so deep was the faith of the people in the relation of this tree to the thunder god,” says Mr. Conway,^[5] “that the Catholics adopted and sanctioned it by a legend one may hear in Bavaria, that on their flight into Egypt the Holy Family took refuge under it from a storm.”

Its supposed immunity from all damage by lightning has long caused special reverence to be attached to it, and given rise to sundry superstitious usages. Thus, in Germany, a twig is cut by the farm-labourer, in spring, and on the first thunderstorm a cross is made with it over every heap of grain, whereby, it is supposed, the corn will remain good for many years. Occasionally, too, one may see hazel twigs placed in the window frames during a heavy shower, and the Tyroleans regard it as an excellent lightning conductor.

As a promoter of fruitfulness it has long been held in high repute—a character which it probably derived from its mythic associations—and hence the important part it plays in love divinations. According to a Bohemian belief, the presence of a large number of hazel-nuts betokens the birth of many illegitimate children; and in the Black Forest it is customary for the leader of a marriage procession to carry a hazel wand. For the same reason, in many parts of Germany, a few nuts are mingled with the seed corn to insure its being prolific. But leaving the hazel with its host of superstitions, we may notice the white-thorn, which according to Aryan tradition was also originally sprung from the lightning. Hence it has acquired a wide reverence, and been invested with supernatural properties. Like, too, the hazel, it was associated with marriage rites.

Thus the Grecian bride was and is still decked with its blossoms, whereas its wood formed the torch which lighted the Roman bridal couple to their nuptial chamber on the wedding day. It is evident, therefore, that the white-thorn was considered a sacred tree long before Christian tradition identified it as forming the Crown of Thorns; a medieval belief which further enhanced the sanctity attached to it. It is not surprising, therefore, that the Irish consider it unlucky to cut down this holy tree, especially as it is said to be under the protection of the fairies, who resent any injury done to it. A legend current in county Donegal, for instance, tells us how a fairy had tried to steal one Joe M'Donough's baby, but the poor mother argued that she had never affronted the fairy tribe to her knowledge. The only cause she could assign was that Joe, “had helped Mr. Todd's gardener to cut down the old hawthorn tree on the lawn; and there's them that says that's a very bad thing to do;” adding how she “fleeched him not to touch it, but the master he offered him six shillings if he'd help in the job, for the other men refused.”

The same belief prevails in Brittany, where it is also “held unsafe to gather even a leaf from certain old and solitary thorns, which grow in sheltered hollows of the moorland, and are the fairies' trysting-places.”^[6]

Then there is the mistletoe, which, like the hazel and the white-thorn, was also supposed to be the embodiment of lightning; and in consequence of its mythical character held an exalted place in the botanical world. As a lightning-plant, we seem to have the key to its symbolical nature, in the circumstance that its branch is forked.

On the same principle, it is worthy of note, as Mr. Fiske remarks^[7] that, “the Hindu commentators of the Veda certainly lay great stress on the fact that the palasa is trident-leaved.” We have already pointed out, too, how the red colour of a flower, as in the case of the berries of the mountain-ash, was apparently sufficient to determine the association of ideas. The Swiss name for mistletoe, *donnerbesen*, “thunder besom,” illustrates its divine origin, on account of which it was supposed to protect the homestead from fire, and hence in Sweden it has long been suspended in farm-houses, like the mountain-ash in Scotland.

But its virtues are by no means limited, for like all lightning-plants its potency is displayed in a variety of ways, its healing properties having from a remote period been in the highest repute. For purposes also of sorcery it has been reckoned of considerable importance, and as a preventive of nightmare and other night scares it is still in favour on the Continent. One reason which no doubt has obtained for it a marked degree of honour is its parasitical manner of growth, which was in primitive times ascribed to the intervention of the gods. According to one of its traditionary origins, its seed was said to be deposited on certain trees by birds, the messengers of the gods, if not the gods themselves in disguise, by which this plant established itself in the branch of a tree. The mode of procedure, say the old botanists, was through the “mistletoe thrush.”

This bird, it was asserted, by feeding on the berries, surrounded its beak with the viscid mucus they contain, to rid itself of which it rubbed its beak, in the course of flying, against the branches of trees, and thereby inserted the seed which gave birth to the new plant. When the mistletoe was found growing on the oak, its presence was attributed specially to the gods, and as such was treated with the deepest reverence.

It was not, too, by accident that the oak was selected, as this tree was honoured by Aryan tradition with being of lightning origin. Hence when the mistletoe was found on its branches, the occurrence was considered as deeply significant, and all the more so as its existence in such a locality was held to be very rare^[8]. Speaking of the oak, it may be noted, that as sacred to Thor, it was under his immediate protection, and hence it was considered an act of sacrilege to mutilate it in ever so small a degree. Indeed, “it was a law of the Ostrogoths that anybody might hew down what trees he pleased in the common wood, except oaks and hazels; those trees had peace, i.e., they were not to be felled^[9].” That profanity of this kind was not treated with immunity was formerly fully believed, an illustration of which is given us by Aubrey,^[10] who says that, “to cut oakwood is unfortunate. There was at Norwood one oak that had mistletoe, a timber tree, which was felled about 1657.

Some persons cut this mistletoe for some apothecaries in London, and sold them a quantity for ten shillings each time, and left only one branch remaining for more to sprout out. One fell lame shortly after; soon after each of the others lost an eye, and he that felled the tree, though warned of these misfortunes of the other men, would, notwithstanding, adventure to do it, and shortly afterwards broke his leg; as if the Hamadryads had resolved to take an ample revenge for the injury done to their venerable and sacred oak.” We can understand, then, how the custom originated of planting the oak on the boundaries of lands, a survival of which still remains in the so-called gospel oaks of many of our English parishes. With Thor's tree thus standing our forefathers felt a sense of security which materially added to the peace and comfort of their daily life.

But its sacred attributes were not limited to this country, many a legend on the Continent testifying to the safety afforded by its sheltering branches. Indeed, so great are its virtues that, according to a Westphalian tradition, the Wandering Jew can only rest where he shall happen to find two oaks growing in the form of a cross. A further proof of its exalted character may be gathered from the fact that around its roots Scandinavian mythology has gathered fairyland, and hence in Germany the holes in its trunk are the pathways for elves. But the connection between lightning and plants extends over a wide area, and Germany is rich in legends relative to this species of folk-lore. Thus there is the magic springwort, around which have clustered so many curious lightning myths and

talismanic properties. By reason of its celestial origin this much-coveted plant, when buried in the ground at the summit of a mountain, has the reputation of drawing down the lightning and dividing the storm.

It is difficult, however, to procure, especially as there is no certainty as to the exact species of plants to which it belongs, although Grimm identifies it with the *Euphorbia lathyris*. At any rate, it is chiefly procurable by the woodpecker—a lightning-bearer; and to secure this much-prized treasure, its nest must be stopped up, access to which it will quickly gain by touching it with the springwort. But if one have in readiness a pan of water, a fire, or a red cloth, the bird will let the plant fall, which otherwise it would be a difficult work to obtain, “the notion, no doubt, being that the bird must return the mystic plant to the element from which it springs, that being either the water of the clouds or the lightning fire enclosed therein.”^[11]

Professor Gubernatis, referring to the symbolical nature of this tradition, remarks that, “this herb may be the moon itself, which opens the hiding-place of the night, or the thunderbolt, which opens the hiding-places of the cloud.” According to the Swiss version of the story it is the hoopoe that brings the spring-wort, a bird also endowed with mystic virtues,^[12] while in Iceland, Normandy, and ancient Greece it is an eagle, a swallow, or an ostrich.

Analogous to the talismanic properties of the springwort are those of the famous luck or key-flower of German folk-lore, by the discovery of which the fortunate possessor effects an entrance into otherwise inaccessible fairy haunts, where unlimited treasures are offered for his acceptance. There then, again, the luck-flower is no doubt intended to denote the lightning, which reveals strange treasures, giving water to the parched and thirsty land, and, as Mr. Fiske remarks, “making plain what is doing under cover of darkness.”^[13] The lightning-flash, too, which now and then, as a lesson of warning, instantly strikes dead those who either rashly or presumptuously essay to enter its awe-inspiring portals, is exemplified in another version of the same legend. A shepherd, while leading his flock over the Ilsentein, pauses to rest, but immediately the mountain opens by reason of the springwort or luck-flower in the staff on which he leans. Within the cavern a white lady appears, who invites him to accept as much of her wealth as he chooses. Thereupon he fills his pockets, and hastening to quit her mysterious domains, he heeds not her enigmatical warning, “Forget not the best,” the result being that as he passes through the door he is severed in twain amidst the crashing of thunder. Stories of this kind, however, are the exception, legendary lore generally regarding the lightning as a benefactor rather than a destroyer.

“The lightning-flash,” to quote Mr. Baring-Gould's words, “reaches the barren, dead, and thirsty land; forth gush the waters of heaven, and the parched vegetation bursts once more into the vigour of life restored after suspended animation.”

That this is the case we have ample proof in the myths relating to plants, in many of which the life-giving properties of the lightning are clearly depicted. Hence, also, the extraordinary healing properties which are ascribed to the various lightning plants.

Ash rods, for instance, are still used in many parts of England for the cure of diseased sheep, cows, and horses, and in Cornwall, as a remedy for hernia, children are passed through holes in ash trees. The mistletoe has the reputation of being an antidote for poisons and a specific against epilepsy. Culpepper speaks of it as a sure panacea for apoplexy, palsy, and falling sickness, a belief current in Sweden, where finger rings are made of its wood.

An old-fashioned charm for the bite of an adder was to place a cross formed of hazel-wood on the wound, and the burning of a thorn-bush has long been considered a sure preventive of mildew in wheat. Without multiplying further illustrations, there can be no doubt that the therapeutic virtues of these so-called lightning plants may be traced to, in very many cases, their mythical origin. It is not surprising too that plants of this stamp should have been extensively used as charms against the influences of occult powers, their symbolical nature investing them with a potency such as was possessed by no ordinary plant.

Footnotes:

1. See an article on "Myths of the Fire Stealer," *Saturday Review*, June 2, 1883, p. 689; Tylor's "Primitive Culture."
2. "Myths and Myth Makers," p. 55.
3. See Keary's "Outlines of Primitive Belief," 1882, p. 98.
4. "Indo-European Tradition and Folk-lore," p. 159.
5. "Mystic Trees and Shrubs," *Fraser's Magazine*, Nov. 1870, p. 599.
6. "Sacred Trees and Flowers," *Quarterly Review*, July 1863, pp. 231, 232.
7. "Myths and Myth Makers," p. 55.
8. See "Flower Lore," pp. 38, 39.
9. Kelly's "Indo-European Folk-lore," p. 179.
10. "Natural History and Antiquities of Surrey," ii. 34.
11. Kelly's "Indo-European Folk-lore," p. 176; Grimm's "Teutonic Mythology," 1884, chap. xxxii.; Gubernatis' "Zoological Mythology," ii. 266-7. See Albertus Magnus, "De Mirab. Mundi," 1601, p. 225.
12. Gubernatis' "Zoological Mythology," ii. 230.
13. "Myths and Mythmakers," p. 58. See Baring-Gould's "Curious Myths of the Middle Ages," 1877, pp. 386-416.
14. Folkard's "Plant-lore Legends and Lyrics," p. 460.
15. See Kelly's "Indo-European Folk-lore," pp. 47-8.

CHAPTER V. PLANTS IN WITCHCRAFT.

The vast proportions which the great witchcraft movement assumed in bygone years explains the magic properties which we find ascribed to so many plants in most countries. In the nefarious trade carried on by the representatives of this cruel system of sorcery certain plants were largely employed for working marvels, hence the mystic character which they have ever since retained. It was necessary, however, that these should be plucked at certain phases of the moon or seasons of the year, or from some spot where the sun was supposed not to have shone on it.^[1]

Hence Shakespeare makes one of his witches speak of "root of hemlock digg'd i' the dark," and of "slips of yew sliver'd in the moon's eclipse," a practice which was long kept up. The plants, too, which formed the witches' pharmacopoeia, were generally selected either from their legendary associations or by reason of their poisonous and soporific qualities. Thus, two of those most frequently used as ingredients in the mystic cauldron were the vervain and the rue, these plants having been specially credited with supernatural virtues. The former probably derived its notoriety from the fact of its being sacred to Thor, an honour which marked it out, like other lightning plants, as peculiarly adapted for occult uses.

It was, moreover, among the sacred plants of the Druids, and was only gathered by them, "when the dog-star arose, from unsunned spots." At the same time, it is noteworthy that many of the plants which were in repute with witches for working their marvels were reckoned as counter-charms, a fact which is not surprising, as materials used by wizards and others for magical purposes have generally been regarded as equally efficacious if

employed against their charms and spells.^[2] Although vervain, therefore, as the “enchanters' plant,” was gathered by witches to do mischief in their incantations, yet, as Aubrey says, it “hinders witches from their will,” a circumstance to which Drayton further refers when he speaks of the vervain as “gainst witchcraft much awayling.” Rue, likewise, which entered so largely into magic rites, was once much in request as an antidote against such practices; and nowadays, when worn on the person in conjunction with agrimony, maiden-hair, broom-straw, and ground ivy, it is said in the Tyrol to confer fine vision, and to point out the presence of witches.

It is still an undecided question as to why rue should out of all other plants have gained its widespread reputation with witches, but M. Maury supposes that it was on account of its being a narcotic and causing hallucinations. At any rate, it seems to have acquired at an early period in this country a superstitious reverence, for, as Mr. Conway says,^[3] “We find the missionaries sprinkling holy water from brushes made of it, whence it was called 'herb of grace'.”

Respecting the rendezvous of witches, it may be noted that they very frequently resorted to hills and mountains, their meetings taking place “on the mead, on the oak sward, under the lime, under the oak, at the pear tree.” Thus the fairy rings which are often to be met with on the Sussex downs are known as hag-tracks,^[4] from the belief that “they are caused by hags and witches, who dance there at midnight.”^[5]

Their love for sequestered and romantic localities is widely illustrated on the Continent, instances of which have been collected together by Grimm, who remarks how “the fame of particular witch mountains extends over wide kingdoms.” According to a tradition current in Friesland,^[6] no woman is to be found at home on a Friday, because on that day they hold their meetings and have dances on a barren heath. Occasionally, too, they show a strong predilection for certain trees, to approach which as night-time draws near is considered highly dangerous. The Judas tree (*Cercis siliquastrum*) was one of their favourite retreats, perhaps on account of its traditionary association with the apostle. The Neapolitan witches held their tryst under a walnut tree near Benevento,^[7] and at Bologna the peasantry tell how these evil workers hold a midnight meeting beneath the walnut trees on St. John's Eve. The elder tree is another haunt under whose branches witches are fond of lurking, and on this account caution must be taken not to tamper with it after dark.^[8]

Again, in the Netherlands, experienced shepherds are careful not to let their flocks feed after sunset, for there are wicked elves that prepare poison in certain plants—nightwort being one of these. Nor does any man dare to sleep in a meadow or pasture after sunset, for, as the shepherds say, he would have everything to fear. A Tyrolese legend^[9] relates how a boy who had climbed a tree, “overlooked the ghastly doings of certain witches beneath its boughs. They tore in pieces the corpse of a woman, and threw the portions in the air. The boy caught one, and kept it by him; but the witches, on counting the pieces, found that one was missing, and so replaced it by a scrap of alderwood, when instantly the dead came to life again.”

Similarly, also, they had their favourite flowers, one having been the foxglove, nicknamed “witches' bells,” from their decorating their fingers with its blossoms; while in some localities the hare-bell is designated the “witches' thimble.” On the other hand, flowers of a yellow or greenish hue were distasteful to them.^[10]

In the witchcraft movement it would seem that certain plants were in requisition for particular purposes, these workers of darkness having utilised the properties of herbs to special ends. A plant was not indiscriminately selected, but on account of possessing some virtue as to render it suitable for any design that the witches might have in view.

Considering, too, how multitudinous and varied were their actions, they had constant need of applying to the vegetable world for materials with which to carry out their plans. But foremost amongst their requirements was the power of locomotion wherewith to enable them with supernatural rapidity to travel from one locality to another. Accordingly, one of their most favourite vehicles was a besom or broom, an implement which, it has been suggested, from its being a type of the winds, is an appropriate utensil “in the hands of the witches, who are

windmakers and workers in that element.^[11]” According to the *Asiatic Register* for 1801, the Eastern as well as the European witches “practise their spells by dancing at midnight, and the principal instrument they use on such occasions is a broom.” Hence, in Hamburg, sailors, after long toiling against a contrary wind, on meeting another ship sailing in an opposite direction, throw an old broom before the vessel, believing thereby to reverse the wind.^[12] As, too, in the case of vervain and rue, the besom, although dearly loved by witches, is still extensively used as a counter-charm against their machinations—it being a well-known belief both in England and Germany that no individual of this stamp can step over a besom laid inside the threshold.

Hence, also, in Westphalia, at Shrovetide, white besoms with white handles are tied to the cows' horns; and, in the rites connected with the Midsummer fires kept up in different parts of the country, the besom holds a prominent place. In Bohemia, for instance, the young men collect for some weeks beforehand as many worn-out brooms as they can lay their hands on. These, after dipping in tar, they light—running with them from one bonfire to another—and when burnt out they are placed in the fields as charms against blight.^[13] The large ragwort—known in Ireland as the “fairies' horse”—has long been sought for by witches when taking their midnight journeys. Burns, in his “Address to the Deil,” makes his witches “skim the muirs and dizzy crags” on “rag-bred nags” with “wicked speed.” The same legendary belief prevails in Cornwall, in connection with the Castle Peak, a high rock to the south of the Logan stone. Here, writes Mr. Hunt,^[14] “many a man, and woman too, now quietly sleeping in the churchyard of St. Levan, would, had they the power, attest to have seen the witches flying into the Castle Peak on moonlight nights, mounted on the stems of the ragwort.” Amongst other plants used for a similar purpose were the bulrush and reed, in connection with—which may be quoted the Irish tale of the rushes and cornstalks that “turn into horses the moment you bestride them^[15].” In Germany^[16] witches were said to use hay for transporting themselves through the air.

When engaged in their various occupations they often considered it expedient to escape detection by assuming invisibility, and for this object sought the assistance of certain plants, such as the fern-seed^[17]. In Sweden, hazel-nuts were supposed to have the power of making invisible, and it may be remembered how in one of Andersen's stories the elfin princess has the faculty of vanishing at will, by putting a wand in her mouth.^[18]

But these were not the only plants supposed to confer invisibility, for German folk-lore tells us how the far-famed luck-flower was endowed with the same wonderful property; and by the ancients the heliotrope was credited with a similar virtue, but which Boccaccio, in his humorous tale of Calandrino in the “Decameron,” applies to the so-called stone. “Heliotrope is a stone of such extraordinary virtue that the bearer of it is effectually concealed from the sight of all present.”

Dante in his “Inferno,” xxiv. 92, further alludes to it:

“Amid this dread exuberance of woe
Ran naked spirits winged with horrid fear,
Nor hope had they of crevice where to hide,
Or heliotrope to charm them out of view.”

In the same way the agate was said to render a person invisible, and to turn the swords of foes against themselves.^[19] The Swiss peasants affirm that the Ascension Day wreaths of the amaranth make the wearer invisible, and in the Tyrol the mistletoe is credited with this property.

But some plants, as we have already pointed out, were credited with the magic property of revealing the presence of witches, and of exposing them engaged in the pursuit of plying their nefarious calling. In this respect the St. John's wort was in great request, and hence it was extensively worn as an amulet, especially in Germany on St. John's Eve, a time when not only witches by common report peopled the air, but evil spirits wandered about on no friendly errand. Thus the Italian name of “devil-chaser,” from the circumstance of its scaring away the workers of darkness, by bringing their hidden deeds to light. This, moreover, accounts for the custom so prevalent in most European countries of decorating doorways and windows with its blossoms on St. John's Eve.

In our own country Stowe^[20] speaks of it as its having been placed over the doors together with green birch, fennel, orpine, and white lilies, whereas in France the peasantry still reverence it as dispersing every kind of unseen evil influence. The elder was invested with similar properties, which seem to have been more potent than even those attributed to the St. John's wort. According to an old tradition, any baptized person whose eyes were anointed with the green juice of its inner bark could see witches in any part of the world. Hence the tree was extremely obnoxious to witches, a fact which probably accounts for its having been so often planted near cottages. Its magic influence has also caused it to be introduced into various rites, as in Styria on Bertha Night (January 6th), when the devil goes about in great force.^[21] As a safeguard, persons are recommended to make a magic circle, in the centre of which they should stand with elder-berries gathered on St. John's Night. By so doing the mystic fern seed may be obtained, which possesses the strength of thirty or forty men. In Germany, too, a species of wild radish is said to reveal witches, as also is the ivy, and saxifrage enables its bearer to see witches on Walpurgis Night.

But, in spite of plants of this kind, witches somehow or other contrived to escape detection by the employment of the most subtle charms and spells. They generally, too, took the precaution of avoiding such plants as were antagonistic to them, displaying a cunning ingenuity in most of their designs which it was by no means easy to forestall. Hence in the composition of their philtres and potions they infused the juices of the most deadly herbs, such as that of the nightshade or monkshood; and to add to the potency of these baleful draughts they considered it necessary to add as many as seven or nine of the most poisonous plants they could obtain, such, for instance, as those enumerated by one of the witches in Ben Jonson's "Masque of Queens," who says:—

“And I ha' been plucking plants among
Hemlock, Henbane, Adder's Tongue;
Nightshade, Moonwort, Libbard's bane,
And twice, by the dogs, was like to be ta'en.”

Another plant used by witches in their incantations was the sea or horned poppy, known in mediaeval times as *Ficus infernalis*; hence it is further noticed by Ben Jonson in the "Witches' Song":

“Yes, I have brought to help our vows,
Horned poppy, cypress boughs,
The fig tree wild that grows on tombs,
And juice that from the larch tree comes.”

Then, of course, there was the wondrous moonwort (*Botrychium lunaria*), which was doubly valuable from its mystic virtue, for, as Culpepper^[22] tells us, it was believed to open locks and possess other magic virtues. The mullein, popularly termed the hag-taper, was also in request, and the honesty (*Lunaria biennis*), “in sorceries excelling,” was equally employed. By Scotch witches the woodbine was a favourite plant,^[23] who, in effecting magical cures, passed their patients nine times through a girth or garland of green woodbine.

Again, a popular means employed by witches of injuring their enemies was by the briony. Coles, in his "Art of Simpling," for instance, informs us how, “they take likewise the roots of mandrake, according to some, or, as I rather suppose, the roots of briony, which simple folk take for the true mandrake, and make thereof an ugly image, by which they represent the person on whom they intend to exercise their witchcraft.” And Lord Bacon, speaking of the mandrake, says—“Some plants there are, but rare, that have a mossie or downy root, and likewise that have a number of threads, like beards, as mandrakes, whereof witches and impostours make an ugly image, giving it the form of a face at the top of the root, and leave those strings to make a broad beard down to the foot.”

The witchcraft literature of the sixteenth and seventeenth centuries contains numerous allusions to the diabolical practice—a superstition immortalised by Shakespeare. The mandrake, from its supposed mysterious character, was intimately associated with witches, and Ben Jonson, in his "Masque of Queens," makes one of the hags who has been gathering this plant say,

“I last night lay all alone
On the ground, to hear the mandrake groan;
And plucked him up, though he grew full low,
And, as I had done, the cock did crow.”

We have already incidentally spoken of the vervain, St. John's wort, elder, and rue as antagonistic to witchcraft, but to these may be added many other well-known plants, such as the juniper, mistletoe, and blackthorn. Indeed, the list might be greatly extended—the vegetable kingdom having supplied in most parts of the world almost countless charms to counteract the evil designs of these malevolent beings. In our own country the little pimpernel, herb-paris, and cyclamen were formerly gathered for this purpose, and the angelica was thought to be specially noisome to witches.

The snapdragon and the herb-betony had the reputation of averting the most subtle forms of witchcraft, and dill and flax were worn as talismans against sorcery. Holly is said to be antagonistic to witches, for, as Mr.

Folkard^[24] says, “in its name they see but another form of the word 'holy,' and its thorny foliage and blood-red berries are suggestive of the most Christian associations.” Then there is the rowan-tree or mountain-ash, which has long been considered one of the most powerful antidotes against works of darkness of every kind, probably from its sacred associations with the worship of the Druids. Hence it is much valued in Scotland, and the following couplet, of which there are several versions, still embodies the popular faith:

“Rowan-tree and red thread,
Put the witches to their speed.”

But its fame has not been confined to any one locality, and as far south as Cornwall the peasant, when he suspects that his cow has been “overlooked,” twists an ashen twig round its horns. Indeed, so potent is the ash as a counter charm to sorcery, that even the smallest twig renders their actions impotent; and hence, in an old ballad entitled “Laidley Wood,” in the “Northumberland Garland,” it is said:

“The spells were vain, the hag returned
To the queen in sorrowful mood,
Crying that witches have no power,
Where there is row'n-tree wood.”

Hence persons carry an ashen twig in their pocket, and according to a Yorkshire proverb:

“If your whipsticks made of row'n,
You may ride your nag through any town;”

But, on the other hand, “Woe to the lad without a rowan-tree gall.” Possessed of such virtues, it is not surprising that the mystic ash should have been held in the highest repute, in illustration of which we find many an amusing anecdote. Thus, according to a Herefordshire tradition, some years ago two hogsheads full of money were concealed in an underground cellar belonging to the Castle of Penyard, where they were kept by supernatural force. A farmer, however, made up his mind to get them out, and employed for the purpose twenty steers to draw down the iron door of the vault. On the door being slightly opened, a jackdaw was seen sitting on one of the casks, but the door immediately closed with a bang—a voice being heard to say,

“Had it not been
For your quicken tree goad,
And your yew tree pin,
You and your cattle
Had all been drawn in.”

Another anecdote current in Yorkshire is interesting, showing how fully superstitions of this kind are believed^[25]:—“A woman was lately in my shop, and in pulling out her purse brought out also a piece of stick a few inches long. I asked her why she carried that in her pocket. 'Oh,' she replied, 'I must not lose that, or I shall

be done for.' 'Why so?' I inquired. 'Well,' she answered, 'I carry that to keep off the witches; while I have that about me, they cannot hurt me.' On my adding that there were no witches nowadays, she instantly replied, 'Oh, yes! there are thirteen at this very time in the town, but so long as I have my rowan-tree safe in my pocket they cannot hurt me.'"

Occasionally when the dairymaid churned for a long time without making butter, she would stir the cream with a twig of mountain ash, and beat the cow with another, thus breaking the witch's spell. But, to prevent accidents of this kind, it has long been customary in the northern countries to make the churn-staff of ash.

For the same reason herd-boys employ an ash-twigg for driving cattle, and one may often see a mountain-ash growing near a house. On the Continent the tree is in equal repute, and in Norway and Denmark rowan branches are usually put over stable doors to keep out witches, a similar notion prevailing in Germany. No tree, perhaps, holds such a prominent place in witchcraft-lore as the mountain-ash, its mystic power having rarely failed to render fruitless the evil influence of these enemies of mankind.

In our northern counties witches are said to dislike the bracken fern, "because it bears on its root the initial C, which may be seen on cutting the root horizontally."^[26] and in most places equally distasteful to them is the yew, perhaps for no better reason than its having formerly been much planted in churchyards. The herb-bennett (*Geum urbanum*), like the clover, from its trefoiled leaf, renders witches powerless, and the hazel has similar virtues. Among some of the plants considered antagonistic to sorcery on the Continent may be mentioned the water-lily, which is gathered in the Rhine district with a certain formula. In Tuscany, the lavender counteracts the evil eye, and a German antidote against the hurtful effects of any malicious influence was an ointment made of the leaves of the marsh-mallow. In Italy, an olive branch which has been blessed keeps the witch from the dwelling, and in some parts of the Continent the plum-tree is used. Kolb, writes Mr. Black,^[27] who became one of the first "wonder-doctors" of the Tyrol, "when he was called to assist any bewitched person, made exactly at midnight the smoke of five different sorts of herbs, and while they were burning the bewitched was gently beaten with a martyr-thorn birch, which had to be got the same night. This beating the patient with thorn was thought to be really beating the hag who had caused the evil."

Some seasons, too, have been supposed to be closely associated with the witches, as in Germany, where all flax must be spun before Twelfth Night, for one who spins afterwards is liable to be bewitched.

Lastly, to counteract the spell of the evil eye, from which many innocent persons were believed to suffer in the witchcraft period, many flowers have been in requisition among the numerous charms used. Thus, the Russian maidens still hang round the stem of the birch-tree red ribbon, the Brahmans gather rice, and in Italy rue is in demand.

The Scotch peasantry pluck twigs of the ash, the Highland women the groundsel, and the German folk wear the radish. In early times the ringwort was recommended by Apuleius, and later on the fern was regarded as a preservative against this baneful influence. The Chinese put faith in the garlic; and, in short, every country has its own special plants. It would seem, too, that after a witch was dead and buried, precautionary measures were taken to frustrate her baneful influence. Thus, in Russia, aspen is laid on a witch's grave, the dead sorceress being then prevented from riding abroad.

Footnotes:

1. See Moncure Conway's "Demonology and Devil Lore," 1880, ii. 324.
2. See Friend's "Flower Lore," ii. 529-30.
3. "Demonology and Devil Lore," ii. 324.
4. Grimm, "Teutonic Mythology," 1883, iii. 1051.
5. Folkard's "Plant Lore, Legends, and Lyrics," 1884, p. 91.

6. Thorpe's "Northern Mythology," iii. 19.
7. Grimm's "Teutonic Mythology," iii. 1052.
8. See Thorpe's "Northern Mythology," iii. 267.
9. See Folkard's "Plant Lore, Legends, and Lyrics," p. 209.
10. *Ibid.*, p. 104.
11. See Kelly's "Indo-European Folk-lore," pp. 225-7.
12. See Hardwick's "Traditions, Superstitions, and Folk-lore," p. 117; also Grimm's "Teutonic Mythology," 1883, iii. 1083.
13. See Thorpe's "Northern Mythology," 1852, iii. 21, 137.
14. "Popular Romances of the West of England," 1871, p. 330.
15. Grimm's "Teutonic Mythology," iii. 1084.
16. See Thorpe's "Northern Mythology," iii. 208-9.
17. See chap. "Doctrine of Signatures."
18. See Yardley's "Supernatural in Romantic Fiction," 1880, pp. 131-2.
19. See Fiske, "Myths and Mythmakers," p. 44; also Baring-Gould's "Curious Myths of the Middle Ages," 1877, p. 398.
20. "Survey of London." See Mason's "Folk-lore of British Plants" in *Dublin University Magazine*, September 1873, p. 326-8.
21. Mr. Conway's "Mystic Trees and Flowers," *Fraser's Magazine*, 1870, 602.
22. "British Herbal."
23. See Folkard's "Plant-lore Legends and Lyrics," p. 380.
24. "Plant-lore Legends and Lyrics," p. 376.
25. Henderson's "Folk-lore of Northern Counties," 1879, p. 225.
26. "Folk-lore of Northern Counties," 1879.
27. "Folk-medicine," p. 202.

CHAPTER VI. PLANTS IN DEMONOLOGY.

The association of certain plants with the devil forms an extensive and important division in their folk-lore, and in many respects is closely connected with their mystic history. It is by no means easy always to account for some of our most beautiful flowers having Satanic surroundings, although frequently the explanation must be sought in their poisonous and deadly qualities. In some cases, too, the student of comparative mythology may trace their evil reputation to those early traditions which were the expressions of certain primitive beliefs, the survivals of which nowadays are found in many an apparently meaningless superstition. Anyhow, the subject is

a very wide one, and is equally represented in most countries. It should be remembered, moreover, that rudimentary forms of dualism—the antagonism of a good and evil deity^[1]—have from a remote period occupied men's minds, a system of belief known even among the lower races of mankind. Hence, just as some plants would in process of time acquire a sacred character, others would do the reverse.

Amongst the legendary stories and folktales of most countries we find frequent allusion to the devil as an active agent in utilising various flowers for his mischievous pursuits; and on the Continent we are told of a certain evil spirit named Kleure who transforms himself into a tree to escape notice, a superstition which under a variety of forms still lingers here and there.^[2] It would seem, too, that in some of our old legends and superstitions the terms Puck and Devil are synonymous, a circumstance which explains the meaning, otherwise unintelligible, of many items of plant-lore in our own and other countries. Thus the word “Puck” has been identified with *Pogge*—toad, under which form the devil was supposed to be personified; and hence probably originated such expressions as toadstools, paddock-stools, &c.

The thorns of the eglantine are said to point downwards, because when the devil was excluded from heaven he tried to regain his lost position by means of a ladder composed of its thorns. But when the eglantine was only allowed to grow as a bush, out of spite he placed its thorns in their present eccentric position. The seed of the parsley, “is apt to come up only partially, according as the devil takes his tithe of it.”^[3] In Germany “devil's oaks” are of frequent occurrence, and “one of these at Gotha is held in great regard.”^[4] and Gerarde, describing the vervain, with its manifold mystic virtues, says that “the devil did reveal it as a secret and divine medicine.” Belladonna, writes Mr. Conway, is esteemed in Bohemia a favourite plant of the devil, who watches it, but may be drawn from it on Walpurgis Night by letting loose a black hen, after which he will run. Then there is the sow-thistle, which in Russia is said to belong to the devil; and Loki, the evil spirit in northern mythology, is occasionally spoken of as sowing weeds among the good seed; from whence, it has been suggested, originated the popular phrase of “sowing one's wild oats.”^[5] The German peasantry have their “rye-wolf,” a malignant spirit infesting the rye-fields; and in some parts of the Continent orchards are said to be infested by evil demons, who, until driven away by various incantations, are liable to do much harm to the fruit. The Italians, again, affirm that in each leaf of the fig-tree an evil spirit dwells; and throughout the Continent there are various other demons who are believed to haunt the crops. Evil spirits were once said to lurk in lettuce-beds, and a certain species was regarded with ill favour by mothers, a circumstance which, Mr. Folkard rightly suggests,^[6] may account for a Surrey saying, “O'er much lettuce in the garden will stop a young wife's bearing.” Among similar legends of the kind it is said that, in Swabia, fern-seed brought by the devil between eleven and twelve o'clock on Christmas night enables the bearer to do as much work as twenty or thirty ordinary men. According to a popular piece of superstition current in our southern counties, the devil is generally supposed to put his cloven foot upon the blackberries on Michaelmas Day, and hence after this date it is considered unlucky to gather them during the remainder of the year. An interesting instance of this superstition is given by Mrs. Latham in her “West Sussex Superstitions,” which happened to a farmer's wife residing in the neighbourhood of Arundel. It appears that she was in the habit of making a large quantity of blackberry jam, and finding that less fruit had been brought to her than she required, she said to the charwoman, “I wish you would send some of your children to gather me three or four pints more.” “Ma'am,” exclaimed the woman in astonishment, “don't you know this is the 11th October?” “Yes,” she replied. “Bless me, ma'am! And you ask me to let my children go out blackberrying! Why, I thought every one knew that the devil went round on the 10th October, and spat on all the blackberries, and that if any person were to eat on the 11th, he or some one belonging to him would either die or fall into great trouble before the year was out.”

In Scotland the devil is said to but throw his cloak over the blackberries and render them unwholesome, while in Ireland he is said to stamp on them. Among further stories of this kind may be quoted one current in Devonshire respecting St. Dunstan, who, it is said, bought up a quantity of barley for brewing beer. The devil, knowing how anxious the saint would be to get a good sale for his beer, offered to blight the apple trees, so that there should be no cider, and hence a greater demand for beer, on condition that he sold himself to him. St. Dunstan accepted the offer, and stipulated that the trees should be blighted on the 17th, 18th, and 19th May. Should the apple-blossom be nipped by cold winds or frost about this time, many allusions are still made to St. Dunstan.

Of the plants associated personally with the evil one may be mentioned the henbane, which is known in Germany as the “devil's eye,” a name applied to the stich-wort in Wales. A species of ground moss is also styled in Germany the “devil's claws;” one of the orchid tribe is “Satan's hand;” the lady's fingers is “devil's claws,” and the plantain is “devil's head.” Similarly the house-leek has been designated the “devil's beard,” and a Norfolk name for the stinkhorn is “devil's horn.” Of further plants related to his Satanic majesty is the clematis, termed “devil's thread,” the toad-flax is his ribbon, the indigo his dye, while the scandix forms his darning-needles. The tritoma, with its brilliant red blossom, is familiar in most localities as the “devil's poker,” and the ground ivy has been nicknamed the “devil's candlestick,” the mandrake supplying his candle. The puff-balls of the lycoperdon form the devil's snuff-box, and in Ireland the nettle is his apron, and the convolvulus his garter; while at Iserlohn, in Germany,^[7] “the mothers, to deter their children eating the mulberries, sing to them that the devil requires them for the purpose of blacking his boots.” The *Arum maculatum* is “devil's ladies and gentlemen,” and the *Ranunculus arvensis* is the “devil on both sides.” The vegetable kingdom also has been equally mindful of his majesty's food, the spurge having long been named “devil's milk” and the briony the “devil's cherry.” A species of fungus, known with us as “witches' butter,” is called in Sweden “devil's butter,” while one of the popular names for the mandrake is “devil's food.” The hare-parsley supplies him with oatmeal, and the stichwort is termed in the West of England “devil's corn.” Among further plants associated with his Satanic majesty may be enumerated the garden fennel, or love-in-a-mist, to which the name of “devil-in-a-bush” has been applied, while the fruit of the deadly nightshade is commonly designated “devil's berries.” Then there is the “devil's tree,” and the “devil's dung” is one of the nicknames of the assafoetida. The hawk-weed, like the scabious, was termed “devil's bit,” because the root looks as if it had been bitten off. According to an old legend, “the root was once longer, until the devil bit away the rest for spite, for he needed it not to make him sweat who is always tormented with fear of the day of judgment.” Gerarde further adds that, “The devil did bite it for envy, because it is an herb that hath so many great virtues, and is so beneficial to mankind.” A species of ranunculus supplies his coach-wheels, and in some parts of the country ferns are said to supply his brushes. His majesty's wants, therefore, have been amply provided for by the vegetable kingdom, for even the wild garlic affords him a posy^[8]. Once more, in Sweden, a rose-coloured flower, known as “Our Lady's hand,” “has two roots like hands, one white, the other black, and when both are placed in water the black one will sink, this is called 'Satan's hand;' but the white one, called 'Mary's hand,' will float.”^[9] Hence this flower is held in deep and superstitious veneration among the peasantry; and in Crete the basil is considered an emblem of the devil, and is placed on most window-ledges, no doubt as a charm.

Some plants, again, have been used for exorcism from their reputed antagonism to all Satanic influence. Thus the avens or herb-bennett, when kept in a house, was believed to render the devil powerless, and the Greeks of old were in the habit of placing a laurel bough over their doorways to keep away evil spirits. The thistle has been long in demand for counteracting the powers of darkness, and in Esthonia it is placed on the ripening corn to drive and scare away malignant demons. In Poland, the disease known among the poorer classes as “elf-lock” is supposed to be the work of wicked spirits, but tradition says it will gradually disappear if one buries thistle seed.^[10] The aloe, by the Egyptians, is reputed to resist any baleful influence, and the lunary or “honesty” is by our own country people said to put every evil influence to flight. In Germany the juniper disperses evil spirits, and in ancient times the black hellebore, peony, and mugwort were largely used for this purpose. According to a Russian belief the elder-tree drives away evil spirits, and hence this plant is held in high respect. Among further plants possessing the same quality are the nettle and milfoil, and then there is the famous St. John's wort, popularly nicknamed “devil's flight.”

Closely allied with this part of our subject are those plants connected with serpents, here forming a very numerous class. Indeed, it was only natural that our ancestors, from their dread of the serpent on account of its poisonous sting, as well as from their antipathy to it as the symbol of evil, should ascertain those plants which seemed either attractive, or antagonistic, to this much-dreaded reptile. Accordingly certain plants, from being supposed to be distasteful to serpents, were much used as amulets to drive them away. Foremost among these may be mentioned the ash, to escape contact with which a serpent, it has been said, would even creep into the fire, in allusion to which Cowley thus writes:

“But that which gave more wonder than the rest,
Within an ash a serpent built her nest
And laid her eggs, when once to come beneath
The very shadow of an ash was death.”

Gerarde notices this curious belief, and tells us that, “the leaves of this tree are so great virtue against serpents that they dare not so much as touch the morning and evening shadows of the tree, but shun them afar off.”

Hence ash-sap was a German remedy for serpent bites. Lucan, in his “Pharsalia” (915-921), has enumerated some of the plants burned for the purpose of expelling serpents:

“Beyond the farthest tents rich fires they build,
That healthy medicinal odours yield,
There foreign galbanum dissolving fries,
And crackling flames from humble wallwort rise.
There tamarisk, which no green leaf adorns,
And there the spicy Syrian custos burns;
There centaury supplies the wholesome flame,
That from Theressian Chiron takes its name;
The gummy larch tree, and the thapsos there,
Woundwort and maidenweed perfume the air,
There the long branches of the long-lived hart
With southernwood their odours strong impart,
The monsters of the land, the serpents fell,
Fly far away and shun the hostile smell.”

The smoke of the juniper was equally repellent to serpents, and the juice of dittany “drives away venomous beasts, and doth astonish them.” In olden times, for serpent bites, agrimony, chamomile, and the fruit of the bramble, were held efficacious, and Gerarde recommends the root of the bugloss, “as it keepeth such from being stung as have drunk it before; the leaves and seeds do the same.” On the other hand, some plants had the reputation of attracting serpents, one of these being the moneywort or creeping loosestrife, with which they were said to heal themselves when wounded. As far back as the time of Pliny serpents were supposed to be very fond of fennel, restoring to them their youth by enabling them to cast their old skins. There is a belief in Thuringia that the possession of fern seed causes the bearer to be pursued by serpents till thrown away; and, according to a curious Eussian proverb, “from all old trees proceeds either an owl or a devil,” in reference, no doubt, to their often bare and sterile appearance.

Footnotes:

1. See Tylor's “Primitive Culture,” ii. 316.
2. Thorpe's “Northern Mythology,” iii. 193.
3. “Plant-lore Legends and Lyrics,” p. 486.
4. Mr. Conway, *Fraser's Magazine*, 1870, p. 593.
5. Mr. Conway, *Fraser's Magazine*, 1870, p. 107.
6. “Plant-lore Legends and Lyrics,” p. 411.
7. Folkard's “Plant-lore Legends and Lyrics,” p. 448.
8. See Friend's “Flower-lore,” i. 68.
9. Thorpe's “Northern Mythology,” ii. 104.

CHAPTER VII. PLANTS IN FAIRY-LORE.

Many plants have gained a notoriety from their connection with fairyland, and although the belief in this romantic source of superstition has almost died out, yet it has left its traces in the numerous legends which have survived amongst us. Thus the delicate white flowers of the wood-sorrel are known in Wales as "fairy bells," from a belief once current that these tiny beings were summoned to their moonlight revels and gambols by these bells. In Ireland they were supposed to ride to their scenes of merrymaking on the ragwort, hence known as the "fairies' horse." Cabbage-stalks, too, served them for steeds, and a story is told of a certain farmer who resided at Dundaniel, near Cork, and was considered to be under fairy control. For a long time he suffered from "the falling sickness," owing to the long journeys which he was forced to make, night by night, with the fairy folk on one of his own cabbage stumps. Sometimes the good people made use of a straw, a blade of grass, or a fern, a further illustration of which is furnished by "The Witch of Fife."

"The first leet night, quhan the new moon set,
Quhan all was douffe and mirk,
We saddled our naigis wi' the moon-fern leif,
And rode fra Kilmerrin kirk.

Some horses were of the brume-cow framit,
And some of the greine bay tree;
But mine was made of ane humloke schaw,
And a stour stallion was he."^[1]

In some folk-tales fairies are represented as employing nuts for their mode of conveyance, in allusion to which Shakespeare, in "Romeo and Juliet," makes Mercutio speak of Queen Mab's arrival in a nut-shell. Similarly the fairies selected certain plants for their attire. Although green seems to have been their popular colour, yet the fairies of the moon were often clad in heath-brown or lichen-dyed garments, whence the epithet of "Elfin-grey." Their petticoats, for instance, were composed of the fox-glove, a flower in demand among Irish fairies for their gloves, and in some parts of that country for their caps, where it is nicknamed "Lusmore," while the *Cuscuta epithymum* is known in Jersey as "fairies' hair." Their raiment was made of the fairy flax, and the wood-anemone, with its fragile blossoms, was supposed to afford them shelter in wet weather. Shakespeare has represented Ariel reclining in "a cowslip's bell," and further speaks of the small crimson drops in its blossom as "gold coats spots"—"these be rubies, fairy favours." And at the present day the cowslip is still known in Lincolnshire as the "fairy cup." Its popular German name is "key-flower;" and no flower has had in that country so extensive an association with preternatural wealth. A well-known legend relates how "Bertha" entices some favoured child by exquisite primroses to a doorway overgrown with flowers. This is the door to an enchanted castle. When the key-flower touches it, the door gently opens, and the favoured mortal passes to a room with vessels covered over with primroses, in which are treasures of gold and jewels. When the treasure is secured the primroses must be replaced, otherwise the finder will be for ever followed by a "black dog."

Sometimes their mantles are made of the gossamer, the cobwebs which may be seen in large quantities on the furze bushes; and so of King Oberon we are told:

"A rich mantle did he wear,
Made of tinsel gossamer,
Bestarred over with a few
Diamond drops of morning dew."

Tulips are the cradles in which the fairy tribe have lulled their offspring to rest, while the *Pyrus japonica* serves them for a fire.^[2] Their hat is supplied by the *Peziza coccinea*; and in Lincolnshire, writes Mr. Friend,^[3] "A kind of fungus like a cup or old-fashioned purse, with small objects inside, is called a fairy-purse." When mending their clothes, the foxglove gives them thimbles; and many other flowers might be added which are equally in

request for their various needs. It should be mentioned, however, that fairies, like witches, have a strange antipathy to yellow flowers, and rarely frequent localities where they grow.

In olden times, we read how in Scandinavia and Germany the rose was under the special protection of dwarfs and elves, who were ruled by the mighty King Laurin, the lord of the rose-garden:

“Four portals to the garden lead, and when the gates are
closed,
No living might dare touch a rose, 'gainst his strict command
opposed;
Whoe'er would break the golden gates, or cut the silken
thread,
Or who would dare to crush the flowers down beneath his
tread,
Soon for his pride would have to pledge a foot and hand;
Thus Laurin, king of Dwarfs, rules within his land.”

We may mention here that the beautiful white or yellow flowers that grow on the banks of lakes and rivers in Sweden are called “neck-roses,” memorials of the Neck, a water-elf, and the poisonous root of the water-hemlock was known as neck-root.^[4]

In Brittany and in some parts of Ireland the hawthorn, or, as it is popularly designated, the fairy-thorn, is a tree most specially in favour. On this account it is held highly dangerous to gather even a leaf “from certain old and solitary thorns which grow in sheltered hollows of the moorlands,” for these are the trysting-places of the fairy race. A trace of the same superstition existed in Scotland, as may be gathered from the subjoined extract from the “Scottish Statistical Report” of the year 1796, in connection with New parish:—“There is a quick thorn of a very antique appearance, for which the people have a superstitious veneration. They have a mortal dread to lop off or cut any part of it, and affirm with a religious horror that some persons who had the temerity to hurt it, were afterwards severely punished for their sacrilege.”

One flower which, for some reason or other, is still held in special honour by them, is the common stichwort of our country hedges, and which the Devonshire peasant hesitates to pluck lest he should be pixy-led. A similar idea formerly prevailed in the Isle of Man in connection with the St. John's wort. If any unwary traveller happened, after sunset, to tread on this plant, it was said that a fairy-horse would suddenly appear, and carry him about all night. Wild thyme is another of their favourite plants, and Mr. Folkard notes that in Sicily rosemary is equally beloved; and that “the young fairies, under the guise of snakes, lie concealed under its branches.” According to a Netherlandish belief, the elf-leaf, or sorceresses' plant, is particularly grateful to them, and therefore ought not to be plucked.^[5]

The four-leaved clover is a magic talisman which enables its wearer to detect the whereabouts of fairies, and was said only to grow in their haunts; in reference to which belief Lover thus writes:

“I'll seek a four-leaved clover
In all the fairy dells,
And if I find the charmed leaf,
Oh, how I'll weave my spells!”

And according to a Danish belief, any one wandering under an elder-bush at twelve o'clock on Midsummer Eve will see the king of fairyland pass by with all his retinue. Fairies' haunts are mostly in picturesque spots (such as among the tufts of wild thyme); and the oak tree, both here and in Germany, has generally been their favourite abode, and hence the superstitious reverence with which certain trees are held, care being taken not to offend their mysterious inhabitants.

An immense deal of legendary lore has clustered round the so-called fairy-rings—little circles of a brighter green in old pastures—within which the fairies were supposed to dance by night. This curious phenomenon, however, is owing to the outspread propagation of a particular mushroom, the fairy-ringed fungus, by which the ground is manured for a richer following vegetation.^[6] Amongst the many other conjectures as to the cause of these verdant circles, some have ascribed them to lightning, and others have maintained that they are produced by ants.^[7] In the “Tempest” (v. i) Prospero invokes the fairies as the “demi-puppets” that:

“By moonshine do the green sour ringlets make,
Whereof the ewe not bites; and you, whose pastime
Is to make midnight mushrooms.”

And in the “Merry Wives of Windsor” (v. 5) Mistress Quickly says:

“And nightly, meadow-fairies, look, you sing,
Like to the Garter's compass, in a ring;
The expressure that it bears, green let it be,
More fertile-fresh than all the field to see.”

Drayton, in his “Nymphidia” (l. 69-72), tells how the fairies:

“In their courses make that round,
In meadows and in marshes found,
Of them so called the fayrie ground,
Of which they have the keeping.”

These fairy-rings have long been held in superstitious awe; and when in olden times May-dew was gathered by young ladies to improve their complexion, they carefully avoided even touching the grass within them, for fear of displeasing these little beings, and so losing their personal charms. At the present day, too, the peasant asserts that no sheep nor cattle will browse on the mystic patches, a natural instinct warning them of their peculiar nature. A few miles from Alnwick was a fairy-ring, round which if people ran more than nine times, some evil was supposed to befall them.

It is generally agreed that fairies were extremely fond of dancing around oaks, and thus in addressing the monarch of the forest a poet has exclaimed:

“The fairies, from their nightly haunt,
In copse or dell, or round the trunk revered
Of Herne's moon-silvered oak, shall chase away
Each fog, each blight, and dedicate to peace
Thy classic shade.”

In Sweden the miliary fever is said by the peasantry to be caused by the elf-mote or meeting with elves, as a remedy for which the lichen aphosus or lichen caninus is sought.

The toadstools often found near these so-called fairy-rings were also thought to be their workmanship, and in some localities are styled pixy-stools, and in the North of Wales “fairy-tables,” while the “cheeses,” or fruit of the mallow, are known in the North of England as “fairy-cheeses.”

A species of wood fungus found about the roots of old trees is designated “fairy-butter,” because after rain, and when in a certain degree of putrefaction, it is reduced to a consistency which, together with its colour, makes it not unlike butter. The fairy-butter of the Welsh is a substance found at a great depth in cavities of limestone rocks. Ritson, in his “Fairy Tales,” speaking of the fairies who frequented many parts of Durham, relates how “a woman who had been in their society challenged one of the guests whom she espied in the market selling fairy-butter,” an accusation, however, which was deeply resented.

Browne, in his “Britannia's Pastorals,” makes the table on which they feast consist of:

“A little mushroom, that was now grown thinner
By being one time shaven for the dinner.”

Fairies have always been jealous of their rights, and are said to resent any infringement of their privileges, one of these being the property of fruit out of season. Any apples, too, remaining after the crop has been gathered in, they claim as their own; and hence, in the West of England, to ensure their goodwill and friendship, a few stray ones are purposely left on the trees. This may partially perhaps explain the ill-luck of plucking flowers out of season^[8]. A Netherlandish piece of folk-lore informs us that certain wicked elves prepare poison in some plants. Hence experienced shepherds are careful not to let their flocks feed after sunset. One of these plants, they say, is nightwort, “which belongs to the elves, and whoever touches it must die^[9].” The disease known in Poland as “elf-lock” is said to be the work of evil fairies or demons, and is cured by burying thistle-seed in the ground. Similarly, in Iceland, says Mr. Conway, “the farmer guards the grass around his field lest the elves abiding in them invade his crops.” Likewise the globe-flower has been designated the troll-flower, from the malignant trolls or elves, on account of its poisonous qualities. On the other hand, the Bavarian peasant has a notion that the elves are very fond of strawberries; and in order that they may be good-humoured and bless his cows with abundance of milk, he is careful to tie a basket of this fruit between the cow's horns.

Of the many legendary origins of the fairy tribe, there is a popular one abroad that mortals have frequently been transformed into these little beings through “eating of ambrosia or some peculiar kind of herb.”^[10]

According to a Cornish tradition, the fern is in some mysterious manner connected with the fairies; and a tale is told of a young woman who, when one day listlessly breaking off the fronds of fern as she sat resting by the wayside, was suddenly confronted by a “fairy widower,” who was in search of some one to attend to his little son. She accepted his offer, which was ratified by kissing a fern leaf and repeating this formula:

“For a year and a day
I promise to stay.”

Soon she was an inhabitant of fairyland, and was lost to mortal gaze until she had fulfilled her stipulated engagement.

In Germany we find a race of elves, somewhat like the dwarfs, popularly known as the Wood or Moss people. They are about the same size as children, “grey and old-looking, hairy, and clad in moss.” Their lives, like those of the Hamadryads, are attached to the trees; and “if any one causes by friction the inner bark to loosen a Wood-woman dies.”^[11] Their great enemy is the Wild Huntsman, who, driving invisibly through the air, pursues and kills them. On one occasion a peasant, hearing the weird baying in a wood, joined in the cry; but on the following morning he found hanging at his stable door a quarter of a green Moss-woman as his share of the game. As a spell against the Wild Huntsman, the Moss-women sit in the middle of those trees upon which the woodcutter has placed a cross, indicating that they are to be hewn, thereby making sure of their safety. Then, again, there is the old legend which tells how Brandan met a man on the sea,^[12] who was, “a thumb long, and floated on a leaf, holding a little bowl in his right hand and a pointer in his left; the pointer he kept dipping into the sea and letting water drop from it into the bowl; when the bowl was full, he emptied it out and began filling it again, his doom consisting in measuring the sea until the judgment-day.” This floating on the leaf is suggestive of ancient Indian myths, and reminds us of Brahma sitting on a lotus and floating across the sea. Vishnu, when, after Brahma's death, the waters have covered all the worlds, sits in the shape of a tiny infant on a leaf of the fig tree, and floats on the sea of milk sucking the toe of his right foot.^[13]

Another tribe of water-fairies are the nixes, who frequently assume the appearance of beautiful maidens. On fine sunny days they sit on the banks of rivers or lakes, or on the branches of trees, combing and arranging their golden locks:

“Know you the Nixes, gay and fair?
Their eyes are black, and green their hair,
They lurk in sedgy shores.”

A fairy or water-sprite that resides in the neighbourhood of the Orkneys is popularly known as Tangie, so-called from *tang*, the seaweed with which he is covered. Occasionally he makes his appearance as a little horse, and at other times as a man.^[14]

Then there are the wood and forest folk of Germany, spirits inhabiting the forests, who stood in friendly relation to man, but are now so disgusted with the faithless world, that they have retired from it. Hence their precept—

“Peel no tree,
Relate no dream,
Pipe no bread, *or*
Bake no cumin in bread,
So will God help thee in thy need.”

On one occasion a “forest-wife,” who had just tasted a new baked-loaf, given as an offering, was heard screaming aloud:

“They've baked for me cumin bread,
That on this house brings great distress.”

The prosperity of the poor peasant was soon on the wane, and before long he was reduced to abject poverty.^[15] These legends, in addition to illustrating the fairy mythology of bygone years, are additionally interesting from their connection with the plants and flowers, most of which are familiar to us from our childhood.

Footnotes:

1. See Crofton Croker's “Fairy Legends and Traditions of the South of Ireland,” 1862, p. 98.

2. Folkard's “Plant-lore Legends and Lyrics,” p. 30.

3. Friend, “Flowers and Flower Lore,” p. 34.

4. Thorpe's “Northern Mythology,” ii. 81-2.

5. Thorpe's “Northern Mythology,” iii. 266.

6. See “The Phytologist,” 1862, p. 236-8.

7. “Folk-lore of Shakespeare,” p. 15.

8. See Friend's “Flower Lore,” i. 34.

9. Thorpe's “Northern Mythology,” iii. 266.

10. Friend's “Flower Lore,” i. 27.

11. See Keightley's “Fairy Mythology,” p. 231.

12. Grimm's “Teut. Myth.,” 1883, ii. 451;

13. “Asiatic Researches,” i. 345.

14. See Keightley's "Fairy Mythology," p. 173.

15. Thorpe's "Northern Mythology," i. 251-3.

CHAPTER VIII. LOVE-CHARMS.

Plants have always been largely used for testing the fidelity of lovers, and at the present day are still extensively employed for this purpose by the rustic maiden. As in the case of medical charms, more virtue would often seem to reside in the mystic formula uttered while the flower is being secretly gathered, than in any particular quality of the flower itself. Then, again, flowers, from their connection with certain festivals, have been consulted in love matters, and elsewhere we have alluded to the knowledge they have long been supposed to give in dreams, after the performance of certain incantations.

Turning to some of the well-known charm formulas, may be mentioned that known as "a clover of two," the mode of gathering it constituting the charm itself:

"A clover, a clover of two,
Put it in your right shoe;
The first young man you meet,
In field, street, or lane,
You'll get him, or one of his name."

Then there is the hempseed formula, and one founded on the luck of an apple-pip, which, when seized between the finger and thumb, is supposed to pop in the direction of the lover's abode; an illustration of which we subjoin as still used in Lancashire:

"Pippin, pippin, paradise,
Tell me where my true love lies,
East, west, north, and south,
Pilling Brig, or Cocker Mouth."

The old custom, too, of throwing an apple-peel over the head, marriage or single blessedness being foretold by its remaining whole or breaking, and of the peel so cast forming the initial of the future loved one, finds many adherents. Equally popular, too, was the practice of divining by a thistle blossom. When anxious to ascertain who loved her most, a young woman would take three or four heads of thistles, cut off their points, and assign to each thistle the name of an admirer, laying them under her pillow. On the following morning the thistle which has put forth a fresh sprout will denote the man who loves her most.

There are numerous charms connected with the ash-leaf, and among those employed in the North of England we may quote the following:

"The even ash-leaf in my left hand,
The first man I meet shall be my husband;
The even ash-leaf in my glove,
The first I meet shall be my love;
The even ash-leaf in my breast,
The first man I meet's whom I love best;
The even ash-leaf in my hand,
The first I meet shall be my man.

Even ash, even ash, I pluck thee,
This night my true love for to see,
Neither in his rick nor in his rear,
But in the clothes he does every day wear."

And there is the well-known saying current throughout the country:

“If you find an even ash or a four-leaved clover,
Rest assured you'll see your true love ere the day is over.”

Longfellow alludes to the husking of the maize among the American colonists, an event which was always accompanied by various ceremonies, one of which he thus forcibly describes:

“In the golden weather the maize was husked, and the
maidens
Blushed at each blood-red ear, for that betokened a lover,
But at the crooked laughed, and called it a thief in the
corn-field:
Even the blood-red ear to Evangeline brought not her
lover.”

Charms of this kind are common, and vary in different localities, being found extensively on the Continent, where perhaps even greater importance is attached to them than in our own country. Thus, a popular French one—which many of our young people also practise—is for lovers to test the sincerity of their affections by taking a daisy and plucking its leaflets off one by one, saying, “Does he love me?—a little—much—passionately—not at all!” the phrase which falls to the last leaflet forming the answer to the inquiry:

“La blanche et simple Paquerette,
Que ton coeur consulte surtout,
Dit, Ton amant, tendre fillette,
T'aime, un peu, beaucoup, point du tout.”

Perhaps Brown alludes to the same species of divination when he writes of:

“The gentle daisy with her silver crown,
Worn in the breast of many a shepherd lass.”

In England the marigold, which is carefully excluded from the flowers with which German maidens tell their fortunes as unfavourable to love, is often used for divination, and in Germany the star-flower and dandelion.

Among some of the ordinary flowers in use for love-divination may be mentioned the poppy, with its “prophetic leaf,” and the old-fashioned “bachelor's buttons,” which was credited with possessing some magical effect upon the fortunes of lovers. Hence its blossoms were carried in the pocket, success in love being indicated in proportion as they lost or retained their freshness. Browne alludes to the primrose, which “maidens as a true-love in their bosoms place;” and in the North of England the kemps or spikes of the ribwort plantain are used as love-charms. The mode of procedure as practised in Northamptonshire is thus picturesquely given by Clare in his “Shepherd's Calendar.”:

“Or trying simple charms and spells,
Which rural superstition tells,
They pull the little blossom threads
From out the knotweed's button heads,
And put the husk, with many a smile,
In their white bosom for a while;

Then, if they guess aright the swain
Their love's sweet fancies try to gain,
'Tis said that ere it lies an hour,
'Twill blossom with a second flower,

And from the bosom's handkerchief
Bloom as it ne'er had lost a leaf."

Then there are the downy thistle-heads, which the rustic maiden names after her lovers, in connection with which there are many old rhymes. Beans have not lost their popularity; and the leaves of the laurel still reveal the hidden fortune, having been also burnt in olden times by girls to win back their errant lovers.

The garden scene in "Faust" is a well-known illustration of the employment of the centaury or bluebottle for testing the faith of lovers, for Margaret selects it as the floral indication whence she may learn the truth respecting Faust:

"And that scarlet poppies around like a bower,
The maiden found her mystic flower.
'Now, gentle flower, I pray thee tell
If my love loves, and loves me well;
So may the fall of the morning dew
Keep the sun from fading thy tender blue;
Now I remember the leaves for my lot—
He loves me not—he loves me—he loves me not—
He loves me! Yes, the last leaf—yes!
I'll pluck thee not for that last sweet guess;
He loves me!' 'Yes,' a dear voice sighed;
And her lover stands by Margaret's side."

Another mode of love-divination formerly much practised among the lower orders was known as "peascod-wooing." The cook, when shelling green peas, would, if she chanced to find a pod having *nine*, lay it on the lintel of the kitchen-door, when the first man who happened to enter was believed to be her future sweetheart; an allusion to which is thus given by Gay:

"As peascod once I pluck'd, I chanced to see
One that was closely fill'd with three times three,
Which, when I cropp'd, I safely home couvey'd,
And o'er the door the spell in secret laid.
The latch mov'd up, when who should first come in,
But, in his proper person, Lublerkin."

On the other hand, it was customary in the North of England to rub a young woman with pease-straw should her lover prove unfaithful:

"If you meet a bonnie lassie,
Gie her a kiss and let her gae;
If you meet a dirty hussey,
Fie, gae rub her o'er wi' strae!"

From an old Spanish proverb it would seem that the rosemary has long been considered as in some way connected with love:

"Who passeth by the rosemarie
And careth not to take a spraye,
For woman's love no care has he,
Nor shall he though he live for aye."

Of flowers and plants employed as love-charms on certain festivals may be noticed the bay, rosebud, and the hempseed on St. Valentine's Day, nuts on St. Mark's Eve, and the St. John's wort on Midsummer Eve.

In Denmark^[1] many an anxious lover places the St. John's wort between the beams under the roof for the purpose of divination, the usual custom being to put one plant for herself and another for her sweetheart. Should these grow together, it is an omen of an approaching wedding. In Brittany young people prove the good faith of their lovers by a pretty ceremony. On St. John's Eve, the men, wearing bunches of green wheat ears, and the women decorated with flax blossoms, assemble round an old historic stone and place upon it their wreaths. Should these remain fresh for some time after, the lovers represented by them are to be united; but should they wither and die away, it is a certain proof that the love will as rapidly disappear. Again, in Sicily it is customary for young women to throw from their windows an apple into the street, which, should a woman pick up, it is a sign that the girl will not be married during the year. Sometimes it happens that the apple is not touched, a circumstance which indicates that the young lady, when married, will ere long be a widow. On this festival, too, the orpine or livelong has long been in request, popularly known as "Midsummer men," whereas in Italy the house-leek is in demand. The moss-rose, again, in years gone by, was plucked, with sundry formalities, on Midsummer Eve for love-divination, an allusion to which mode of forecasting the future, as practised in our own country, occurs in the poem of "The Cottage Girl:"

"The moss-rose that, at fall of dew,
Ere eve its duskier curtain drew,
Was freshly gathered from its stem,
She values as the ruby gem;
And, guarded from the piercing air,
With all an anxious lover's care,
She bids it, for her shepherd's sake,
Awake the New Year's frolic wake:
When faded in its altered hue,
She reads—the rustic is untrue!
But if its leaves the crimson paint,
Her sick'ning hopes no longer faint;
The rose upon her bosom worn,
She meets him at the peep of morn."

On the Continent the rose is still thought to possess mystic virtues in love matters, as in Thuringia, where girls foretell their future by means of rose-leaves.

A ceremony belonging to Hallowe'en is observed in Scotland with some trepidation, and consists in eating an apple before a looking-glass, when the face of the desired one will be seen. It is thus described by Burns:

"Wee Jenny to her granny says,
'Will ye gae wi' me, granny?
I'll eat the apple at the glass
I gat frae uncle Johnny.'
She fufft her pipe wi' sic a lunt,
In wrath she was sae vap'rin,
She notic't na an aizle brunt
Her braw new worset apron
Out thro' that night.

'Ye little skelpie limmer's face!
I daur you try sic sportin'
As seek the foul thief ony place,
For him to spae your fortune;
Nae doubt but ye may get a sight!
Great cause ye hae to fear it,
For mony a ane has gotten a fright,

And lived and died deleeret
On sic a night.”“

Hallowe'en also is still a favourite anniversary for all kinds of nut-charms, and St. Thomas was long invoked when the prophetic onion named after him was placed under the pillow. Rosemary and thyme were used on St. Agnes' Eve with this formula:

“St. Agnes, that's to lovers kind,
Come, ease the troubles of my mind.”

In Austria, on Christmas Eve, apples are used for divination. According to Mr. Conway, the apple must be cut in two in the dark, without being touched, the left half being placed in the bosom, and the right laid behind the door. If this latter ceremony be carefully carried out, the desired one may be looked for at midnight near the right half. He further tells us that in the Erzgebirge, the maiden, having slept on St. Andrew's, or Christmas, night with an apple under her pillow, “takes her stand with it in her hand on the next festival of the Church thereafter; and the first man whom she sees, other than a relative, will become her husband.”

Again, in Bohemia, on Christmas Eve, there is a pretty practice for young people to fix coloured wax-lights in the shells of the first nuts they have opened that day, and to float them in water, after silently assigning to each the name of some fancied wooer. He whose little barque is the first to approach the girl will be her future husband; but, on the other hand, should an unwelcome suitor seem likely to be the first, she blows against it, and so, by impeding its progress, allows the favoured barque to win.

In very early times flowers were much in request as love-philtres, various allusions to which occur in the literature of most ages. Thus, in “A Midsummer Night's Dream,” Oberon tells Puck to place a pansy on the eyes of Titania, in order that, on awaking, she may fall in love with the first object she encounters. Gerarde speaks of the carrot as “serving for love matters,” and adds that the root of the wild species is more effectual than that of the garden. Vervain has long been in repute as a love-philtre, and in Germany now-a-days endive-seed is sold for its supposed power to influence the affections. The root of the male fern was in years gone by used in love-philtres, and hence the following allusion:

“’Twas the maiden's matchless beauty
That drew my heart a-nigh;
Not the fern-root potion,
But the glance of her blue eye.”

Then there is the basil with its mystic virtues, and the cumin-seed and cyclamen, which from the time of Theophrastus have been coveted for their magic virtues. The purslane, crocus, and periwinkle were thought to inspire love; while the agnus castus and the Saraca Indica (one of the sacred plants of India), a species of the willow, were supposed to drive away all feelings of love. Similarly in Voigtland, the common basil was regarded as a test of chastity, withering in the hands of the impure. The mandrake, which is still worn in France as a love-charm, was employed by witches in the composition of their philtres; and in Bohemia, it is said that if a maiden can secretly put a sprig of the common clover into her lover's shoe ere he sets out on a journey, he will be faithful to her during his absence. As far back as the time of Pliny, the water-lily was regarded as an antidote to the love-philtre, and the amaranth was used for curbing the affections. On the other hand, Our Lady's bedstraw and the mallow were supposed to have the reverse effect, while the myrtle not only created love, but preserved it. The Sicilians still employ hemp to secure the affections of those they love, and gather it with various formalities,^[2] fully believing in its potency. Indeed, charms of this kind are found throughout the world, every country having its own special plants in demand for this purpose. However whimsical they may seem, they at any rate have the sanction of antiquity, and can claim an antecedent history certainly worthy of a better cause.

Footnotes:

1. Thorpe's “Northern Mythology.”

CHAPTER IX. DREAM-PLANTS.

The importance attached to dreams in all primitive and savage culture accounts for the significance ascribed to certain plants found by visitors to dreamland. At the outset, it may be noticed that various drugs and narcotic potions have, from time immemorial, been employed for producing dreams and visions—a process still in force amongst uncivilised tribes. Thus the Mundrucus of North Brazil, when desirous of gaining information on any special subject, would administer to their seers narcotic drinks, so that in their dreams they might be favoured with the knowledge required. Certain of the Amazon tribes use narcotic plants for encouraging visions, and the Californian Indians, writes Mr. Tylor,^[1] “would give children narcotic potions, to gain from the ensuing visions information about their enemies;” whilst, he adds, “the Darien Indians used the seeds of the *Datura sanguinea* to bring on in children prophetic delirium, in which they revealed hidden treasure.” Similarly, the Delaware medicine-men used to drink decoctions of an intoxicating nature, “until their minds became wildered, so that they saw extraordinary visions.”^[2]

The North American Indians also held intoxication by tobacco to be supernatural ecstasy. It is curious to find a survival of this source of superstition in modern European folk-lore. Thus, on the Continent, many a lover puts the four-leaved clover under his pillow to dream of his lady-love; and in our own country, daisy-roots are used by the rustic maiden for the same purpose. The Russians are familiar with a certain herb, known as the *son-trava*, a dream herb, which has been identified with the *Pulsatilla patens*, and is said to blossom in April, and to have an azure-coloured flower. When placed under the pillow, it will induce dreams, which are generally supposed to be fulfilled. It has been suggested that it was from its title of “tree of dreams” that the elm became a prophetic tree, having been selected by Virgil in the *Aeneid* (vi.) as the roosting-place of dreams in gloomy Orcus:

“Full in the midst a spreading elm displayed
His aged arms, and cast a mighty shade;
Each trembling leaf with some light visions teems,
And leaves impregnated with airy dreams.”

At the present day, the yarrow or milfoil is used by love-sick maidens, who are directed to pluck the mystic plant from a young man's grave, repeating meanwhile this formula:

“Yarrow, sweet yarrow, the first that I have found, In the name of Jesus
Christ I pluck it from the ground; As Jesus loved sweet Mary and took
her for His dear, So in a dream this night I hope my true love
will appear.”

Indeed, many other plants are in demand for this species of love-divination, some of which are associated with certain days and festivals. In Sweden, for instance, “if on Midsummer night nine kinds of flowers are laid under the head, a youth or maiden will dream of his or her sweetheart.”^[3] Hence in these simple and rustic love-charms may be traced similar beliefs as prevail among rude communities.

Again, among many of the American Indian tribes we find, according to Mr. Dorman,^[4] “a mythical tree or vine, which has a sacredness connected with it of peculiar significance, forming a connecting-link and medium of communication between the world of the living and the dead. It is generally used by the spirit as a ladder to pass downward and upward upon; the Ojibways having possessed one of these vines, the upper end of which was twined round a star.” He further adds that many traditions are told of attempts to climb these heavenly ladders; and, “if a young man has been much favoured with dreams, and the people believe he has the art of looking into futurity, the path is open to the highest honours. The future prophet puts down his dreams in pictographs, and when he has a collection of these, if they prove true in any respect, then this record of his revelations is appealed to as proof of his prophetic power.” But, without enumerating further instances of these

savage dream-traditions, which are closely allied with the animistic theories of primitive culture, we would turn to those plants which modern European folk-lore has connected with dreamland. These are somewhat extensive, but a brief survey of some of the most important ones will suffice to indicate their general significance.

Firstly, to dream of white flowers has been supposed to prognosticate death; with which may be compared the popular belief that “if a white rosebush puts forth unexpectedly, it is a sign of death to the nearest house;” dream-omens in many cases reflecting the superstitions of daily life. In Scotch ballads the birch is associated with the dead, an illustration of which we find in the subjoined lines:—

“I dreamed a dreary dream last nicht;
God keep us a' frae sorrow!
I dreamed I pu'd the birk sae green,
Wi' my true love on Yarrow.

I'll redde your dream, my sister dear,
I'll tell you a' your sorrow;
You pu'd the birk wi' your true love;
He's killed,—he's killed on Yarrow.”

Of the many plants which have been considered of good omen when seen in dreams, may be mentioned the palm-tree, olive, jasmine, lily, laurel, thistle, thorn, wormwood, currant, pear, &c.; whereas the greatest luck attaches to the rose. On the other hand, equally numerous are the plants which denote misfortune. Among these may be included the plum, cherry, withered roses, walnut, hemp, cypress, dandelion, &c. Beans are still said to produce bad dreams and to portend evil; and according to a Leicestershire saying, “If you wish for awful dreams or desire to go crazy, sleep in a bean-field all night.” Some plants are said to foretell long life, such as the oak, apricot, apple, box, grape, and fig; and sickness is supposed to be presaged by such plants as the elder, onion, acorn, and plum.

Love and marriage are, as might be expected, well represented in the dream-flora; a circumstance, indeed, which has not failed to impress the young at all times. Thus, foremost amongst the flowers which indicate success in love is the rose, a fact which is not surprising when it is remembered how largely this favourite of our gardens enters into love-divinations. Then there is the clover, to dream of which foretells not only a happy marriage, but one productive of wealth and prosperity. In this case, too, it must be remembered the clover has long been reckoned as a mystic plant, having in most European countries been much employed for the purposes of divination. Of further plants credited as auguring well for love affairs are the raspberry, pomegranate, cucumber, currant, and box; but the walnut implies unfaithfulness, and the act of cutting parsley is an omen that the person so occupied will sooner or later be crossed in love. This ill-luck attached to parsley is in some measure explained from the fact that in many respects it is an unlucky plant. It is a belief, as we have noticed elsewhere, widely spread in Devonshire, that to transplant parsley is to commit a serious offence against the guardian genius who presides over parsley-beds, certain to be punished either on the offender himself or some member of his family within the course of the year. Once more “to dream of cutting cabbage,” writes Mr. Folkard,^[5] “Denotes jealousy on the part of wife, husband, or lover, as the case may be. To dream of any one else cutting them portends an attempt by some person to create jealousy in the loved one's mind. To dream of eating cabbages implies sickness to loved ones and loss of money.” The bramble, an important plant in folk-lore, is partly unlucky, and, “To dream of passing through places covered with brambles portends troubles; if they prick you, secret enemies will do you an injury with your friends; if they draw blood, expect heavy losses in trade.” But to dream of passing through brambles unhurt denotes a triumph over enemies. To dream of being pricked with briars, says the “Royal Dream Book,”^[6] “shows that the person dreaming has an ardent desire to something, and that young folks dreaming thus are in love, who prick themselves in striving to gather their rose.”

Some plants are said to denote riches, such as the oak, marigold, pear and nut tree, while the gathering of nuts is said to presage the discovery of unexpected wealth. Again, to dream of fruit or flowers out of season is a bad omen, a notion, indeed, with which we find various proverbs current throughout the country. Thus, the

Northamptonshire peasant considers the blooming of the apple-tree after the fruit is ripe as a certain omen of death—a belief embodied in the following proverb:

“A bloom upon the apple-tree when the apples are ripe,
Is a sure termination to somebody's life.”

And once more, according to an old Sussex adage—

“Fruit out of season
Sounds out of reason.”

On the other hand, to dream of fruit or any sort of crop during its proper season is still an indication of good luck.^[7] Thus it is lucky to dream of daisies in spring-time or summer, but just the reverse in autumn or winter. Without enumerating further instances of this kind, we may quote the subjoined rhyme relating to the onion, as a specimen of many similar ones scattered here and there in various countries:^[8]

“To dream of eating onions means
Much strife in thy domestic scenes,
Secrets found out or else betrayed,
And many falsehoods made and said.”

Many plants in dream-lore have more than one meaning attached to them. Thus from the, “Royal Dream Book” we learn that yellow flowers “predict love mixed with jealousy, and that you will have more children to maintain than what justly belong to you.” To dream of garlic indicates the discovery of hidden treasures, but the approach of some domestic quarrel.

Cherries, again, indicate inconstancy; but one would scarcely expect to find the thistle regarded as lucky; for, according to an old piece of folk-lore, to dream of being surrounded by this plant is a propitious sign, foretelling that the person will before long have some pleasing intelligence. In the same way a similar meaning in dream-lore attaches to the thorn.

According to old dream-books, the dreaming of yew indicates the death of an aged person, who will leave considerable wealth behind him; while the violet is said to denote advancement in life. Similarly, too, the vine foretells prosperity, “for which,” says a dream interpreter, “we have the example of Astyages, king of the Medes, who dreamed that his daughter brought forth a vine, which was a prognostic of the grandeur, riches, and felicity of the great Cyrus, who was born of her after this dream.”

Plucking ears of corn signifies the existence of secret enemies, and Mr. Folkard quotes an old authority which tells us that the juniper is potent in dreams. Thus, “it is unlucky to dream of the tree itself, especially if the person be sick; but to dream of gathering the berries, if it be in winter, denotes prosperity. To dream of the actual berries signifies that the dreamer will shortly arrive at great honours and become an important person. To the married it foretells the birth of a male child.”

Again, eating almonds signifies a journey, its success or otherwise being denoted by their tasting sweet or the contrary. Dreaming of grass is an auspicious omen, provided it be green and fresh; but if it be withered and decayed, it is a sign of the approach of misfortune and sickness, followed perhaps by death. Woe betide, too, the person who dreams that he is cutting grass.

Certain plants produce dreams on particular occasions. The mugwort and plantain have long been associated with Midsummer; and, according to Thomas Hill in his “Natural and Artificial Conclusions,” a rare coal is to be found under these plants but one hour in the day, and one day in the year. When Aubrey happened to be walking behind Montague House at twelve o'clock on Midsummer day, he relates how he saw about twenty-two young women, most of them well dressed, and apparently all very busy weeding. On making inquiries, he was informed that they were looking for a coal under the root of a plantain, to put beneath their heads that night, when they would not fail to dream of their future husbands. But, unfortunately for this credulity, as an old author

long ago pointed out, the coal is nothing but an old dead root, and that it may be found almost any day and hour when sought for. By lovers the holly has long been supposed to have mystic virtues as a dream-plant when used on the eve of any of the following festivals:

Christmas,
New Year's Day,
Midsummer, and
All Hallowe'en.

According to the mode of procedure practised in the northern counties, the anxious maiden, before retiring to rest, places three pails full of water in her bedroom, and then pins to her night-dress three leaves of green holly opposite to her heart, after which she goes to sleep. Believing in the efficacy of the charm, she persuades herself that she will be roused from her first slumber by three yells, as if from the throats of three bears, succeeded by as many hoarse laughs. When these have died away, the form of her future husband will appear, who will show his attachment to her by changing the position of the water-pails, whereas if he have no particular affection he will disappear without even touching them.

Then, of course, from time immemorial all kinds of charms have been observed on St. Valentine's Day to produce prophetic dreams. A popular charm consisted of placing two bay leaves, after sprinkling them with rose-water, across the pillow, repeating this formula:—

“Good Valentine, be kind to me,
In dream let me my true love see.”

St. Luke's Day was in years gone by a season for love-divination, and among some of the many directions given we may quote the subjoined, which is somewhat elaborate:—

“Take marigold flowers, a sprig of
marjoram, thyme, and a little wormwood; dry them before a fire, rub them
to powder, then sift it through a fine piece of lawn; simmer these with
a small quantity of virgin honey, in white vinegar, over a slow fire;
with this anoint your stomach, breasts, and lips, lying down, and repeat
these words thrice:—

'St Luke, St. Luke, be kind to me,
In dream let me my true love see!'

This said, hasten to sleep, and in the soft slumbers of night's repose,
the very man whom you shall marry shall appear before you.”

Lastly, certain plants have been largely used by gipsies and fortune-tellers for invoking dreams, and in many a country village these are plucked and given to the anxious inquirer with various formulas.

Footnotes:

1. “Primitive Culture,” 1873, ii. 416, 417.
2. See Dorman's “Primitive Superstition,” p. 68.
3. Thorpe's “Northern Mythology,” 1851, ii. 108.
4. “Primitive Superstitions,” p. 67.
5. “Plant-lore Legends and Lyrics,” p. 265.
6. Quoted in Brand's “Popular Antiquities,” 1849, iii. 135.

7. See Friend's "Flower-Lore," i. 207.

8. Folkard's "Plant-lore Legends and Lyrics," p. 477.

CHAPTER X. PLANTS AND THE WEATHER.

The influence of the weather on plants is an agricultural belief which is firmly credited by the modern husbandman. In many instances his meteorological notions are the result of observation, although in some cases the reason assigned for certain pieces of weather-lore is far from obvious. Incidental allusion has already been made to the astrological doctrine of the influence of the moon's changes on plants—a belief which still retains its hold in most agricultural districts. It appears that in years gone by "neither sowing, planting, nor grafting was ever undertaken without a scrupulous attention to the increase or waning of the moon;"^[1] and the advice given by Tusser in his "Five Hundred Points of Husbandry" is not forgotten even at the present day:—

"Sow peas and beans in the wane of the moon,
Who soweth them sooner, he soweth too soon,
That they with the planet may rest and rise,
And flourish with bearing, most plentiful-wise."

Many of the old gardening books give the same advice, although by some it has been severely ridiculed.

Scott, in his "Discoverie of Witchcraft," notes how, "the poor husbandman perceiveth that the increase of the moon maketh plants fruitful, so as in the full moone they are in best strength, decaying in the wane, and in the conjunction do entirely wither and fade." Similarly the growth of mushrooms is said to be affected by the weather, and in Devonshire apples "shrump up" if picked during a waning moon.^[2]

One reason, perhaps, for the attention so universally paid to the moon's changes in agricultural pursuits is, writes Mr. Farrer, "that they are far more remarkable than any of the sun's, and more calculated to inspire dread by the nocturnal darkness they contend with, and hence are held in popular fancy nearly everywhere, to cause, portend, or accord with changes in the lot of mortals, and all things terrestrial."^[3]

On this assumption may be explained the idea that the, "moon's wane makes things on earth to wane; when it is new or full it is everywhere the proper season for new crops to be sown." In the Hervey Islands cocoa-nuts are generally planted in the full of the moon, the size of the latter being regarded as symbolical of the ultimate fulness of the fruit.

In the same way the weather of certain seasons of the year is supposed to influence the vegetable world, and in Rutlandshire we are told that "a green Christmas brings a heavy harvest;" but a full moon about Christmas Day is unlucky, hence the adage:

"Light Christmas, light wheatsheaf,
Dark Christmas, heavy wheatsheaf."

If the weather be clear on Candlemas Day "corn and fruits will then be dear," and "whoever doth plant or sow on Shrove Tuesday, it will always remain green." According to a piece of weather-lore in Sweden, there is a saying that to strew ash branches in a field on Ash Wednesday is equivalent to three days' rain and three days' sun. Rain on Easter Day foretells a good harvest but poor hay crop, while thunder on All Fool's Day "brings good crops of corn and hay." According to the "Shepherd's Calendar," if, "Midsummer Day be never so little rainy the hazel and walnut will be scarce; corn smitten in many places; but apples, pears, and plums will not be hurt." And we are further reminded:—

"Till St. James's Day be come and gone,
There may be hops or there may be none."

Speaking of hops, it is said, “plenty of ladybirds, plenty of hops.” It is also a popular notion among our peasantry that if a drop of rain hang on an oat at this season there will be a good crop. Another agricultural adage says:—

“No tempest, good July, lest corn come off bluey.”

Then there is the old Michaelmas rhyme:—

“At Michaelmas time, or a little before,
Half an apple goes to the core;
At Christmas time, or a little after,
A crab in the hedge, and thanks to the grafter.”

On the other hand, the blossoming of plants at certain times is said to be an indication of the coming weather, and so when the bramble blooms early in June an early harvest may be expected; and in the northern counties the peasant judges of the advance of the year by the appearance of the daisy, affirming that “spring has not arrived till you can set your foot on twelve daisies.” We are also told that when many hawthorn blossoms are seen a severe winter will follow; and, according to Wilsford, “the broom having plenty of blossoms is a sign of a fruitful year of corn.” A Surrey proverb tells us that “It's always cold when the blackthorn comes into flower;” and there is the rhyme which reminds us that:—

“If the oak is out before the ash,
'Twill be a summer of wet and splash;
But if the ash is before the oak,
'Twill be a summer of fire and smoke.”

There are several versions of this piece of weather-lore, an old Kentish one being “Oak, smoke; ash, quash;” and according to a version given in Notes and Queries (1st Series v. 71):—

“If the oak's before the ash, then you'll only get a splash,
If the ash precedes the oak, then you may expect a soak.”

From the “Shepherd's Calendar” we learn that, “If in the fall of the leaf in October many leaves wither on the boughs and hang there, it betokens a frosty winter and much snow,” with which may be compared a Devonshire saying:—

“If good apples you would have
The leaves must go into the grave.”

Or, in other words, “you must plant your trees in the fall of the leaf.” And again, “Apples, pears, hawthorn-quick, oak; set them at All-hallow-tide and command them to prosper; set them at Candlemas and entreat them to grow.”

In Germany,^[4] too, there is a rhyme which may be thus translated:—

“When the hawthorn bloom too early shows,
We shall have still many snows.”

In the same way the fruit of trees and plants was regarded as a prognostication of the ensuing weather, and Wilsford tells us that “great store of walnuts and almonds presage a plentiful year of corn, especially filberts.” The notion that an abundance of haws betokens a hard winter is still much credited, and has given rise to the familiar Scotch proverb:—

“Mony haws,
Mony snaws.”

Another variation of the same adage in Kent is, “A plum year, a dumb year,” and, “Many nits, many pits,” implying that the abundance of nuts in the autumn indicates the “pits” or graves of those who shall succumb to the hard and inclement weather of winter; but, on the other hand, “A cherry year, a merry year.” A further piece of weather-lore tells us:—

“Many rains, many rowans;
Many rowans, many yawns,”

The meaning being that an abundance of rowans—the fruit of the mountain-ash—denote a deficient harvest.

Among further sayings of this kind may be noticed one relating to the onion, which is thus:—

“Onion's skin very thin,
Mild-winter's coming in;
Onion's skin thick and tough,
Coming winter cold and rough.”

Again, many of our peasantry have long been accustomed to arrange their farming pursuits from the indications given them by sundry trees and plants. Thus it is said—

“When the sloe tree is as white as a sheet,
Sow your barley whether it be dry or wet.”

With which may be compared another piece of weather-lore:—

“When the oak puts on his gosling grey,
'Tis time to sow barley night or day.”

The leafing of the elm has from time immemorial been made to regulate agricultural operations, and hence the old rule:—

“When the elmen leaf is as big as a mouse's ear,
Then to sow barley never fear.
When the elmen leaf is as big as an ox's eye,
Then say I, 'Hie, boys, hie!’”

A Warwickshire variation is:—

“When elm leaves are big as a shilling,
Plant kidney beans, if to plant 'em you're willing.
When elm leaves are as big as a penny,
You *must* plant kidney beans if you mean to have any.”

But if the grass grow in January, the husbandman is recommended to “lock his grain in the granary,” while a further proverb informs us that:—

“On Candlemas Day if the thorns hang a drop,
You are sure of a good pea crop.”

In bygone times the appearance of the berries of the elder was held to indicate the proper season for sowing wheat:—

“With purple fruit when elder branches bend,
And their high hues the hips and cornels lend,
Ere yet chill hoar-frost comes, or sleety rain,
Sow with choice wheat the neatly furrowed plain.”

The elder is not without its teaching, and according to a popular old proverb:—

“When the elder is white, brew and bake a peck,
When the elder is black, brew and bake a sack.”

According to an old proverb, “You must look for grass on the top of the oak tree,” the meaning being, says Ray, that “the grass seldom springs well before the oak begins to put forth.”

In the Western Counties it is asserted that frost ceases as soon as the mulberry tree bursts into leaf, with which may be compared the words of Autolycus in the “Winter's Tale” (iv. 3):—

“When daffodils begin to peer,
With heigh! the doxy over the dale,
Why, then conies in the sweet o' the year.”

The dairyman is recommended in autumn to notice the appearance of the fern, because:—

“When the fern is as high as a ladle,
You may sleep as long as you are able.
When the fern begins to look red,
Then milk is good with brown bread.”

Formerly certain agricultural operations were regulated by the seasons, and an old rule tells the farmer—

“Upon St. David's Day, put oats and barley in the clay.”

Another version being:—

“Sow peas and beans on David and Chad,
Be the weather good or bad.”

A Somersetshire piece of agricultural lore fixes an earlier date, and bids the farmer to “sow or set beans in Candlemas waddle.” In connection with the inclement weather that often prevails throughout the spring months it is commonly said, “They that go to their corn in May may come weeping away,” but “They that go in June may come back with a merry tune.” Then there is the following familiar pretty couplet, of which there are several versions:—

“The bee doth love the sweetest flower,
So doth the blossom the April shower.”

In connection with beans, there is a well-known adage which says:—

“Be it weal or be it woe,
Beans should blow before May go.”

Of the numerous other items of plant weather-lore, it is said that “March wind wakes the ether (*i. e.*, adder) and blooms the whin;” and many of our peasantry maintain that:—

“A peck of March dust and a shower in May,
Makes the corn green and the fields gay.”

It should also be noted that many plants are considered good barometers. Chickweed, for instance, expands its leaves fully when fine weather is to follow; but “if it should shut up, then the traveller is to put on his greatcoat.”^[5] The same, too, is said to be the case with the pimpernel, convolvulus, and clover; while if the marigold does not open its petals by seven o'clock in the morning, either rain or thunder may be expected in the course of the day. According to Wilsford, “tezils, or fuller's thistle, being gathered and hanged up in the house,

where the air may come freely to it, upon the alteration of cold and windy weather will grow smoother, and against rain will close up its prickles." Once more, according to the "Shepherd's Calendar," "Chaff, leaves, thistle-down, or such light things whisking about and turning round foreshows tempestuous winds;" And Coles, in his introduction to the "Knowledge of Plants," informs us that, "If the down flieth off colt's-foot, dandelion, and thistles when there is no wind, it is a sign of rain."

Some plants, again, have gained a notoriety from opening or shutting their flowers at the sun's bidding; in allusion to which Perdita remarks in the "Winter's Tale" (iv. 3):—

"The marigold, that goes to bed with the sun, and with him rises weeping."

It was also erroneously said, like the sun-flower, to turn its blossoms to the sun, the latter being thus described by Thomson:—

"The lofty follower of the sun,
Sad when he sets, shuts up her yellow leaves,
Drooping all night, and, when he warm returns,
Points her enamour'd bosom to his ray."

Another plant of this kind is the endive, which is said to open its petals at eight o'clock in the morning, and to close them at four in the afternoon. Thus we are told how:—

"On upland slopes the shepherds mark
The hour when, to the dial true,
Cichorium to the towering lark,
Lifts her soft eye, serenely blue."

And as another floral index of the time of day may be noticed the goat's-beard, opening at sunrise and closing at noon—hence one of its popular names of "Go to bed at noon." This peculiarity is described by Bishop Mant:—

"And goodly now the noon-tide hour,
When from his high meridian tower
The sun looks down in majesty,
What time about, the grassy lea.
The goat's-beard, prompt his rise to hail,
With broad expanded disk, in veil
Close mantling wraps its yellow head,
And goes, as peasants say, to bed."

The dandelion has been nicknamed the peasant's clock, its flowers opening very early in the morning; while its feathery seed-tufts have long been in requisition as a barometer with children:—

"Dandelion, with globe of down,
The schoolboy's clock in every town,
Which the truant puffs amain
To conjure lost hours back again."

Among other flowers possessing a similar feature may be noticed the wild succory, creeping mallow, purple sandwort, small bindweed, common nipplewort, and smooth sow-thistle. Then of course there is the pimpernel, known as the shepherd's clock and poor man's weather-glass; while the small purslane and the common garden lettuce are also included in the flower-clock.^[6]

Among further items of weather-lore associated with May, we are told how he that "sows oats in May gets little that way," and "He who mows in May will have neither fruit nor hay." Calm weather in June "sets corn in tune;"

and a Suffolk adage says:—

“Cut your thistles before St. John,
You will have two instead of one.”

But “Midsummer rain spoils hay and grain,” whereas it is commonly said that,

“A leafy May, and a warm June,
Bring on the harvest very soon.”

Again, boisterous wet weather during the month of July is to be deprecated, for, as the old adage runs:—

“No tempest, good July,
Lest the corn look surly.”

Flowers of this kind are very numerous, and under a variety of forms prevail largely in our own and other countries, an interesting collection of which have been collected by Mr. Swainson in his interesting little volume on “Weather Folk-lore,” in which he has given the parallels in foreign countries. It must be remembered, however, that a great number of these plant-sayings originated very many years ago—long before the alteration in the style of the calendar—which in numerous instances will account for their apparent contradictory character. In noticing, too, these proverbs, account must be taken of the variation of climate in different countries, for what applies to one locality does not to another. Thus, for instance, according to a Basque proverb, “A wet May, a fruitful year,” whereas it is said in Corsica, “A rainy May brings little barley and no wheat.” Instances of this kind are of frequent occurrence, and of course are in many cases explained by the difference of climate. But in comparing all branches of folk-lore, similar variations, as we have already observed, are noticeable, to account for which is often a task full of difficulty.

Of the numerous other instances of weather-lore associated with agricultural operations, it is said in relation to rain:—

“Sow beans in the mud, and they'll grow like wood.”

And a saying in East Anglia is to this effect:—

“Sow in the slop (or sop), heavy at top.”

A further admonition advises the farmer to

“Sow wheat in dirt, and rye in dust;”

While, according to a piece of folk-lore current in East Anglia, “Wheat well-sown is half-grown.” The Scotch have a proverb warning the farmer against premature sowing:—

“Nae hurry wi' your corns,
Nae hurry wi' your harrows;
Snaw lies ahint the dyke,
Mair may come and fill the furrows.”

And according to another old adage we are told how:—

“When the aspen leaves are no bigger than your nail,
Is the time to look out for truff and peel.”^[7]

In short, it will be found that most of our counties have their items of weather-lore; many of which, whilst varying in some respect, are evidently modifications of one and the same belief. In many cases, too, it must be admitted that this species of weather-wisdom is not based altogether on idle fancy, but in accordance with

recognised habits of plants under certain conditions of weather. Indeed, it has been pointed out that so sensitive are various flowers to any change in the temperature or the amount of light, that it has been noticed that there is as much as one hour's difference between the time when the same flower opens at Paris and Upsala. It is, too, a familiar fact to students of vegetable physiology that the leaves of *Porleria hygrometrica* fold down or rise up in accordance with the state of the atmosphere. In short, it was pointed out in the *Standard*, in illustration of the extreme sensitiveness of certain plants to surrounding influences, how the *Haedysarums* have been well known ever since the days of Linnseus to suddenly begin to quiver without any apparent cause, and just as suddenly to stop. Force cannot initiate the movement, though cold will stop it, and heat will set in motion again the suspended animation of the leaves. If artificially kept from moving they will, when released, instantly begin their task anew and with redoubled energy. Similarly the leaves of the *Colocasia esculenta*—the tara of the Sandwich Islands—will often shiver at irregular times of the day and night, and with such energy that little bells hung on the petals tinkle. And yet, curious to say, we are told that the keenest eye has not yet been able to detect any peculiarity in these plants to account for these strange motions. It has been suggested that they are due to changes in the weather of such a slight character that, “our nerves are incapable of appreciating them, or the mercury of recording their accompanying oscillations.”

Footnotes:

1. Tylor's "Primitive Culture," 1873, i. 130.
2. See "English Folk-lore," pp. 42, 43.
3. "Primitive Manners and Customs," p. 74.
4. Dublin University Magazine, December 1873, p. 677.
5. See Swainson's "Weather-lore," p. 257.
6. See "Flower-lore," p. 226.
7. See *Notes and Queries*, 1st Ser. II. 511.

CHAPTER XI. PLANT PROVERBS.

A host of curious proverbs have, from the earliest period, clustered round the vegetable world, most of which—gathered from experience and observation—embody an immense amount of truth, besides in numerous instances conveying an application of a moral nature. These proverbs, too, have a very wide range, and on this account are all the more interesting from the very fact of their referring to so many conditions of life. Thus, the familiar adage which tells us that “nobody is fond of fading flowers,” has a far deeper signification, reminding us that everything associated with change and decay must always be a matter of regret. To take another trite proverb of the same kind, we are told how “truths and roses have thorns about them,” which is absolutely true; and there is the well-known expression “to pipe in an ivy leaf,” which signifies “to go and engage in some futile or idle pursuit” which cannot be productive of any good. The common proverb, “He hath sown his wild oats,” needs no comment; and the inclination of evil to override good is embodied in various adages, such, as, “The weeds o’ergrow the corn,” while the tenacity with which evil holds its ground is further expressed in such sayings as this—“The frost hurts not weeds.” The poisonous effects, again, of evil is exemplified thus—“One ill-bred mars a whole pot of pottage,” and the rapidity with which it spreads has, amongst other proverbs, been thus described, “Evil weeds grow apace.” Speaking of weeds in their metaphorical sense, we may quote one further adage respecting them:—

“A weed that runs to seed
Is a seven years' weed.”

And the oft-quoted phrase, “It will be a nosegay to him as long as he lives,” implies that disagreeable actions, instead of being lost sight of, only too frequently cling to a man in after years, or, as Ray says, “stink in his

nostrils.” The man who abandons some good enterprise for a worthless, or insignificant, undertaking is said to “cut down an oak and plant a thistle,” of which there is a further version, “to cut down an oak and set up a strawberry.” The truth of the next adage needs no comment—“Usurers live by the fall of heirs, as swine by the droppings of acorns.”

Things that are slow but sure in their progress are the subject of a well-known Gloucestershire saying:—

“It is as long in coming as Cotswold barley.”

“The corn in this cold country,” writes Ray, “exposed to the winds, bleak and shelterless, is very backward at the first, but afterwards overtakes the forwardest in the country, if not in the barn, in the bushel, both for the quantity and goodness thereof.” According to the Italians, “Every grain hath its bran,” which corresponds with our saying, “Every bean hath its black,” The meaning being that nothing is without certain imperfections. A person in extreme poverty is often described as being “as bare as the birch at Yule Even,” and an ill-natured or evil-disposed person who tries to do harm, but cannot, is commonly said to:—

“Jump at it like a cock at a gooseberry.”

Then the idea of durableness is thus expressed in a Wiltshire proverb:—

“An eldern stake and a blackthorn ether ^[hedge],
Will make a hedge to last for ever”—

an elder stake being commonly said to last in the ground longer than an iron bar of the same size.^[1]

A person who is always on the alert to make use of opportunities, and never allows a good thing to escape his grasp, is said to “have a ready mouth for a ripe cherry.” The rich beauty, too, of the cherry, which causes it to be gathered, has had this moral application attached to it:—

“A woman and a cherry are painted for their own harm.”

Speaking of cherries, it may be mentioned that the awkwardness of eating them on account of their stones, has given rise to sundry proverbs, as the following:—

“Eat peas with the king, and cherries with the beggar,”

and:—

“Those that eat cherries with great persons shall have their eyes
squirted out with the stones.”

A man who makes a great show without a corresponding practice is said to be like “fig-tree fuel, much smoke and little fire,” and another adage says:—

“Peel a fig for your friend, and a peach for your enemy.”

This proverb, however, is not quite clear when applied to this country. “To peel a fig, so far as we are concerned,” writes Mr. Hazlitt^[2], “can have no significance, except that we should not regard it as a friendly service; but, in fact, the proverb is merely a translation from the Spanish, and in that language and country the phrase carries a very full meaning, as no one would probably like to eat a fig without being sure that the fruit had not been tampered with. The whole saying is, however, rather unintelligible. ‘Peeling a peach’ would be treated anywhere as a dubious attention.”

Of the many proverbs connected with thorns, there is the true one which tells us how,

“He that goes barefoot must not plant thorns,”

The meaning of which is self-evident, and the person who lives in a chronic state of uneasiness is said to, “sit on thorns.” Then there is the oft-quoted adage:—

“While thy shoe is on thy foot, tread upon the thorns.”

On the other hand, that no position in life is exempt from trouble of some kind is embodied in this proverb:—

“Wherever a man dwells he shall be sure to have a thorn bush near his door,”

which Ray also explains in its literal sense, remarking that there “are few places in England where a man can dwell, but he shall have one near him.” Then, again, thorns are commonly said to “make the greatest crackling,” and “the thorn comes forth with its point forward.”

Many a great man has wished himself poor and obscure in his hours of adversity, a sentiment contained in the following proverb:—

“The pine wishes herself a shrub when the axe is at her root.”

A quaint phrase applied to those who expect events to take an unnatural turn is:—

“Would you have potatoes grow by the pot-side?”

Amongst some of the other numerous proverbs may be mentioned a few relating to the apple; one of these reminding us that,

“An apple, an egg, and a nut,
You may eat after a slut.”

Selfishness in giving is thus expressed:—

“To give an apple where there is an orchard.”

And the idea of worthlessness is often referred to as when it is said that “There is small choice in rotten apples,” with which may be compared another which warns us of the contagious effects of bad influence:—

“The rotten apple injures its neighbour.”

The utter dissimilarity which often exists between two persons, or things, is jocularly enjoined in the familiar adage:—

“As like as an apple is to a lobster,”

And the folly of taking what one knows is paltry or bad has given rise to an instructive proverb:—

“Better give an apple than eat it.”

The folly of expecting good results from the most unreasonable causes is the subject of the following old adage:—

“Plant the crab where you will, it will never bear pippins.”

The crab tree has also been made the subject of several amusing rhymes, one of which is as follows:—

“The crab of the wood is sauce very good for the crab of the sea,
But the wood of the crab is sauce for a drab that will not her husband obey.”

The coolness of the cucumber has long ago become proverbial for a person of a cold collected nature, “As cool as a cucumber,” and the man who not only makes unreasonable requests, but equally expects them to be gratified, is said to “ask an elm-tree for pears.” Then, again, foolish persons who have no power of observation, are likened to “a blind goose that knows not a fox from a fern bush.”

The willow has long been a proverbial symbol of sadness, and on this account it was customary for those who were forsaken in love to wear a garland made of willow. Thus in “Othello,” Desdemona (Act iv. sc. 3) anticipating her death, says:—

“My mother had a maid called Barbara:
She was in love; and he she loved proved mad,
And did forsake her: she had a song of willow;
An old thing 'twas, but it expressed her fortune,
And she died singing it: that song to-night
Will not go from my mind.”

According to another adage:—

“Willows are weak, yet they bind other wood,”

The significance of which is clear. Then, again, there is the not very complimentary proverbial saying, of which there are several versions:—

“A spaniel, a woman, and a walnut-tree,
The more they're beaten, the better they be.”

Another variation, given by Moor in his “Suffolk Words” (p. 465), is this:—

“Three things by beating better prove:
A nut, an ass, a woman;
The cudgel from their back remove,
And they'll be good for no man.”

A curious phrase current in Devonshire for a young lady who jilts a man is, “She has given him turnips;” and an expressive one for those persons who in spite of every kindness are the very reverse themselves is this:—

“Though you stroke the nettle
ever so kindly, yet it will sting you;”

With which may be compared a similar proverb equally suggestive:—

“He that handles a nettle tenderly is soonest stung.”

The ultimate effects of perseverance, coupled with time, is thus shown:—

“With time and patience the leaf of the mulberry tree
becomes satin.”

A phrase current, according to Ray, in Gloucestershire for those “who always have a sad, severe, and terrific countenance,” is, “He looks as if he lived on Tewkesbury mustard”—this town having been long noted for its “mustard-balls made there, and sent to other parts.” It may be remembered that in “2 Henry IV.” (Act ii. sc. 4)

Falstaff speaks of “wit as thick as Tewkesbury mustard.” Then there is the familiar adage applied to the man who lacks steady application, “A rolling stone gathers no moss,” with which may be compared another, “Seldom mosseth the marble-stone that men ^[tread] oft upon.”

Among the good old proverbs associated with flax may be mentioned the following, which enjoins the necessity of faith in our actions:—

“Get thy spindle and thy distaff ready, and God will send the flax.”

A popular phrase speaks of “An owl in an ivy-bush,” which perhaps was originally meant to denote the union of wisdom with conviviality, equivalent to “Be merry and wise.” Formerly an ivy-bush was a common tavern sign, and gave rise to the familiar proverb, “Good wine needs no bush,” this plant having been selected probably from having been sacred to Bacchus.

According to an old proverb respecting the camomile, we are told that “the more it is trodden the more it will spread,” an allusion to which is made by Falstaff in “I Henry IV.” (Act ii. sc. 4):—

“For though the camomile, the more it is trodden on, the faster it grows; yet youth, the more it is wasted, the sooner it wears.”

There are many proverbs associated with the oak. Referring to its growth, we are told that “The willow will buy a horse before the oak will pay for a saddle,” the allusion being, of course, to the different rates at which trees grow. That occasionally some trifling event may have the most momentous issues is thus exemplified:—

“The smallest axe may fell the largest oak;”

Although, on the other hand, it is said that:—

“An oak is not felled at one chop.”

A further variation of the same idea tells us how:—

“Little strokes fell great oaks,”

In connection with which may be quoted the words of Ovid to the same effect:—

“Quid magis est durum saxo? Quid mollius unda?
Dura taneu molli saxa cavantur aqua?”

Then, again, it is commonly said that:—

“Oaks may fall when seeds brave the storm.”

And to give one more illustration:—

“The greatest oaks have been little acorns.”

Similarly, with trees in general, we find a good number of proverbs. Thus one informs us that “Wise men in the world are like timber trees in a hedge, here and there one.” That there is some good in every one is illustrated by this saying—“There's no tree but bears some fruit.” The familiar proverb, that “The tree is no sooner down but every one runs for his hatchet,” explains itself, whereas “The highest tree hath the greater fall,” which, in its moral application, is equally true. Again, an agricultural precept enjoins the farmer to “Set trees poor and they will grow rich; set them rich and they will grow poor,” that is, remove them out of a more barren into a fatter soil. That success can only be gained by toil is illustrated in this proverb—“He that would have the fruit must climb the tree,” and once more it is said that “He who plants trees loves others beside himself.”

In the Midland counties there is a proverbial saying that “if there are no kegs or seeds in the ash trees, there will be no king within the twelvemonth,” the ash never being wholly destitute of kegs. Another proverb refers to the use of ash-wood for burning:—

“Burn ash-wood green,
'Tis a fire for a queen,
Burn ash-wood dear,
'Twill make a man swear;”

The meaning being that the ash when green burns well, but when dry or withered just the reverse.

A form of well-wishing formerly current in Yorkshire was thus:—

“May your footfall be by the root of an ash,”

In allusion, it has been suggested, to the fact that the ash is a capital tree for draining the soil in its vicinity.

But leaving trees, an immense number of proverbs are associated with corn, many of which are very varied. Thus, of those who contrive to get a good return for their meagre work or money, it is said:—

“You have made a long harvest for a little corn,”

With which may be compared the phrase:—

“You give me coloquintida (colocynth) for Herb-John.”

Those who reap advantage from another man's labour are said to “put their sickle into another man's corn,” and the various surroundings of royalty, however insignificant they may be, are generally better, says the proverb, than the best thing of the subjects:—

“The king's chaff is better than other people's corn.”

Among the proverbs relating to grass may be mentioned the popular one, “He does not let the grass grow under his feet;” another old version of which is, “No grass grows on his heel.” Another well-known adage reminds us that:—

“The higher the hill the lower the grass.”

And equally familiar is the following:—

“While the grass groweth the seely horse starveth.”

In connection with hops, the proverb runs that “hops make or break;” and no hop-grower, writes,

Mr. Hazlitt,^[3] “will have much difficulty in appreciating this proverbial dictum. An estate has been lost or won in the course of a single season; but the hop is an expensive plant to rear, and a bad year may spoil the entire crop.”

Actions which produce different results to what are expected are thus spoken of:—

“You set saffron and there came up wolfsbane.”

In Devonshire it may be noted that this plant is used to denote anything of value; and it is related of a farmer near Exeter who, when praising a certain farm, remarked, “'Tis a very pretty little place; he'd let so dear as saffron.”

Many, again, are the proverbial sayings associated with roses—most of these being employed to indicate what is not only sweet and lovely, but bright and joyous. Thus, there are the well-known phrases, “A bed of roses,” and “As sweet as a rose,” and the oft-quoted popular adage:—

“The rose, called by any other name, would smell as sweet,”

Which, as Mr. Hazlitt remarks, “although not originally proverbial, or in its nature, or even in the poet's intention so, has acquired that character by long custom.”

An old adage, which is still credited by certain of our country folk, reminds us that:—

“A parsley field will bring a man to his saddle and a woman to her grave,”

A warning which is not unlike one current in Surrey and other southern counties:—

“Where parsley's grown in the garden, there'll be a death before the year's out.”

In Devonshire it has long been held unlucky to transplant parsley, and a poor woman in the neighbourhood of Morwenstow attributed a certain stroke with which one of her children had been afflicted after whooping-cough to the unfortunate undoing of the parsley bed. In the “Folk-lore Record,” too, an amusing instance is related of a gardener at Southampton, who, for the same reason, refused to sow some parsley seed. It may be noted that from a very early period the same antipathy has existed in regard to this plant, and it is recorded how a few mules laden with parsley threw into a complete panic a Greek force on its march against the enemy. But the plant no doubt acquired its ominous significance from its having been largely used to bestrew the tombs of the dead; the Greek term “*dehithai selinou*”—to be in need of parsley—was a common phrase employed to denote those on the point of death. There are various other superstitions attached to this plant, as in Hampshire, where the peasants dislike giving any away for fear of some ill-luck befalling them. Similarly, according to another proverb:—

“Sowing fennel is sowing sorrow.”

But why this should be so it is difficult to explain, considering that by the ancients fennel was used for the victor's wreath, and, as one of the plants dedicated to St. John, it has long been placed over doors on his vigil. On the other hand, there is a common saying with respect to rosemary, which was once much cultivated in kitchen gardens:—

“Where rosemary flourishes the lady rules.”

Vetches, from being reputed a most hardy grain, have been embodied in the following adage:—

“A thetch will go through
The bottom of an old shoe,”

Which reminds us of the proverbial saying:—

“Like a camomile bed,
The more it is trodden
The more it will spread.”

The common expression:—

“Worth a plum,”

Is generally said of a man who is accredited with large means, and another adage tells us that,

“The higher the plum-tree, the riper the plum.”

To live in luxury and affluence is expressed by the proverbial phrase “To live in clover,” with which may be compared the saying “Do it up in lavender,” applied to anything which is valuable and precious. A further similar phrase is “Laid up in lavender,” in allusion to the old-fashioned custom of scenting newly-washed linen with this fragrant plant. Thus Shenstone says:—

“Lavender, whose spikes of azure bloom
Shall be, erewhile, in arid bundles bound,

To lurk amidst the labours of her loom,
And crown her kerchiefs clean with mickle rare perfume.”

According to Gerarde, the Spartans were in the habit of eating cress with their bread, from a popular notion very generally held among the ancients, that those who ate it became noted for their wit and decision of character. Hence the old proverb:—

“Eat cress to learn more wit.”

Of fruit proverbs we are told that,

“If you would enjoy the fruit, pluck not the flower.”

And again:—

“When all fruit fails, welcome haws.”

And “If you would have fruit, you must carry the leaf to the grave;” which Ray explains, “You must transplant your trees just about the fall of the leaf,” and then there is the much-quoted rhyme:—

“Fruit out of season,
Sorrow out of reason.”

Respecting the vine, it is said:—

“Make the vine poor, and it will make you rich,”

That is, prune off its branches; and another adage is to this effect: “Short boughs, long vintage.” The constant blooming of the gorse has given rise to a popular Northamptonshire proverb:—

“When gorse is out of bloom, kissing is out of season.”

The health-giving properties of various plants have long been in the highest repute, and have given rise to numerous well-known proverbs, which are still heard in many a home. Thus old Gerarde, describing the virtues of the mallow, tells us:—

“If that of health you have any special care,
Use French mallows, that to the body wholesome are.”

Then there is the time-honoured adage which says that:—

“He that would live for aye
Must eat sage in May.”

And Aubrey has bequeathed us the following piece of advice:—

“Eat leeks in Lide, and ramsines in May,
And all the year after physicians may play.”

There are many sayings of this kind still current among our country-folk, some of which no doubt contain good advice; and of the plantain, which from time immemorial has been used as a vulnerary, it is said:—

“Plantain ribbed, that heals the reaper's wounds.”

In Herefordshire there is a popular rhyme associated with the aul (*Alnus glutinosus*):—

“When the bud of the aul is as big as the trout's eye,
Then that fish is in season in the river Wye.”

A Yorkshire name for the quaking grass (*Briza media*) is “trembling jockies,” and according to a local proverb:—

“A trimmling jock i' t' house,
An' you weean't hev a mouse,”

This plant being, it is said, obnoxious to mice. According to a Warwickshire proverb:—

“Plant your sage and rue together,
The sage will grow in any weather.”

This list of plant proverbs might easily be extended, but the illustrations quoted in the preceding pages are a fair sample of this portion of our subject. Whereas many are based on truth, others are more or less meaningless. At any rate, they still thrive to a large extent among our rural community, by whom they are regarded as so many household sayings.

Footnotes:

1. See Akerman's “Wiltshire Glossary,” p. 18.
2. “English Proverbs and Proverbial Phrases,” pp. 327-8.
3. “Proverbs and Proverbial Phrases,” p. 207.

CHAPTER XII. PLANTS AND THEIR CEREMONIAL USE.

In the earliest period of primitive society flowers seem to have been largely used for ceremonial purposes. Tracing their history downwards up to the present day, we find how extensively, throughout the world, they have entered into sacred and other rites. This is not surprising when we remember how universal have been the love and admiration for these choice and lovely productions of nature's handiwork. From being used as offerings in the old heathen worship they acquired an additional veneration, and became associated with customs which had important significance. Hence the great quantity of flowers required, for ceremonial purposes of various kinds, no doubt promoted and encouraged a taste for horticulture even among uncultured tribes. Thus the Mexicans had their famous floating gardens, and in the numerous records handed down of social life, as it existed in different countries, there is no lack of references to the habits and peculiarities of the vegetable world.

Again, from all parts of the world, the histories of bygone centuries have contributed their accounts of the rich assortment of flowers in demand for the worship of the gods, which are valuable as indicating how elaborate and extensive was the knowledge of plants in primitive periods, and how magnificent must have been the display of these beautiful and brilliant offerings. Amongst some tribes, too, so sacred were the flowers used in religious rites held, that it was forbidden so much as to smell them, much less to handle them, except by those whose privileged duty it was to arrange them for the altar. Coming down to the historic days of Greece and Rome, we

have abundant details of the skill and care that were displayed in procuring for religious purposes the finest and choicest varieties of flowers; abundant allusions to which are found in the old classic writings.

The profuseness with which flowers were used in Rome during triumphal processions has long ago become proverbial, in allusion to which Macaulay says:—

“On they ride to the Forum,
While laurel boughs, and flowers,
From house-tops and from windows,
Fell on their crests in showers.”

Flowers, in fact, were in demand on every conceivable occasion, a custom which was frequently productive of costly extravagance. Then there was their festival of the Floralia, in honour of the reappearance of spring-time, with its hosts of bright blossoms, a survival of which has long been kept up in this country on May Day, when garlands and carols form the chief feature of the rustic merry-making. Another grand ceremonial occasion, when flowers were specially in request, was the Fontinalia, an important day in Rome, for the wells and fountains were crowned with flowers:—

“Fontinalia festus erat dies Romae, quo in fontes
coronas projiciebant, puteosque coronabant, ut a quibus pellucidos
liquores at restinguendam sitim acciperent, iisdem gratiam referre hoc
situ viderentur.”

A pretty survival of this festival has long been observed in the well-dressing of Tissington on Ascension Day, when the wells are most beautifully decorated with leaves and flowers, arranged in fanciful devices, interwoven into certain symbols and texts. This floral rite is thus described in “The Fleece”:—

“With light fantastic toe, the nymphs
Thither assembled, thither every swain;
And o'er the dimpled stream a thousand flowers,
Pale lilies, roses, violets and pinks,
Mix'd with the greens of bouret, mint, and thyme,
And trefoil, sprinkled with their sportive arms,
Such custom holds along th' irriguous vales,
From Wreken's brow to rocky Dolvoryn,
Sabrina's early haunt.”

With this usage may be compared one performed by the fishermen of Weymouth, who on the first of May put out to sea for the purpose of scattering garlands of flowers on the waves, as a propitiatory offering to obtain food for the hungry. “This link,” according to Miss Lambert, “is but another link in the chain that connects us with the yet more primitive practice of the Red Indian, who secures passage across the Lake Superior, or down the Mississippi, by gifts of precious tobacco, which he wafts to the great spirit of the Flood on the bosom of its waters.”

By the Romans a peculiar reverence seems to have attached to their festive garlands, which were considered unsuitable for wearing in public. Hence, any person appearing in one was liable to punishment, a law which was carried out with much rigour. On one occasion, Lucius Fulvius, a banker, having been convicted at the time of the second Punic war, of looking down from the balcony of a house with a chaplet of roses on his head, was thrown into prison by order of the Senate, and here kept for sixteen years, until the close of the war. A further case of extreme severity was that of P. Munatius, who was condemned by the Triumviri to be put in chains for having crowned himself with flowers from the statue of Marsyas.

Allusions to such estimation of garlands in olden times are numerous in the literature of the past, and it may be remembered how Montesquieu remarked that it was with two or three hundred crowns of oak that Rome conquered the world.

Guests at feasts wore garlands of flowers tied with the bark of the linden tree, to prevent intoxication; the wreath having been framed in accordance with the position of the wearer. A poet, in his paraphrase on Horace, thus illustrates this custom:—

“Nay, nay, my boy, 'tis not for me
This studious pomp of Eastern luxury;
Give me no various garlands fine
With linden twine;
Nor seek where latest lingering blows
The solitary rose.”

Not only were the guests adorned with flowers, but the waiters, drinking-cups, and room, were all profusely decorated.^[1] “In short,” as the author of “Flower-lore” remarks, “it would be difficult to name the occasions on which flowers were not employed; and, as almost all plants employed in making garlands had a symbolical meaning, the garland was composed in accordance with that meaning.” Garlands, too, were thrown to actors on the stage, a custom which has come down to the present day in an exaggerated form.

Indeed, many of the flowers in request nowadays for ceremonial uses in our own and other countries may be traced back to this period; the symbolical meaning attached to certain plants having survived after the lapse of many centuries. For a careful description of the flowers thus employed, we would refer the reader to two interesting papers contributed by Miss Lambert to the *Nineteenth Century*,^[2] in which she has collected together in a concise form all the principal items of information on the subject in past years. A casual perusal of these papers will suffice to show what a wonderful knowledge of botany the ancients must have possessed; and it may be doubted whether the most costly array of plants witnessed at any church festival supersedes a similar display witnessed by worshippers in the early heathen temples. In the same way, we gain an insight into the profusion of flowers employed by heathen communities in later centuries, showing how intimately associated these have been with their various forms of worship. Thus, the Singhalese seem to have used flowers to an almost incredible extent, and one of their old chronicles tells us how the Ruanwelle dagoba—270 feet high—was festooned with garlands from pedestal to pinnacle, till it had the appearance of one uniform bouquet. We are further told that in the fifteenth century a certain king offered no less than 6,480,320 sweet-smelling flowers at the shrine of the tooth; and, among the regulations of the temple at Dambedenia in the thirteenth century, one prescribes that “every day an offering of 100,000 blossoms, and each day a different kind of flower,” should be presented. This is a striking instance, but only one of many.

“With regard to Greece, there are few of our trees and flowers,” writes Mr. Moncure Conway,^[3] “which were not cultivated in the gorgeous gardens of Epicurus, Pericles, and Pisistratus.” Among the flowers chiefly used for garlands and chaplets in ceremonial rites we find the rose, violet, anemone, thyme, melilot, hyacinth, crocus, yellow lily, and yellow flowers generally. Thucydides relates how, in the ninth year of the Peloponnesian War, the temple of Juno at Argos was burnt down owing to the priestess Chrysis having set a lighted torch too near the garlands and then fallen asleep. The garlands caught fire, and the damage was irremediable before she was conscious of the mischief. The gigantic scale on which these floral ceremonies were conducted may be gathered from the fact that in the procession of Europa at Corinth a huge crown of myrtle, thirty feet in circumference, was borne. At Athens the myrtle was regarded as the symbol of authority, a wreath of its leaves having been worn by magistrates. On certain occasions the mitre of the Jewish high priest was adorned with a chaplet of the blossoms of the henbane. Of the further use of garlands, we are told that the Japanese employ them very freely;^[4] both men and women wearing chaplets of fragrant blossoms. A wreath of a fragrant kind of olive is the reward of literary merit in China. In Northern India the African marigold is held as a sacred flower; they adorn the trident emblem of Mahadiva with garlands of it, and both men and women wear chaplets made of its flowers on his festivals. Throughout Polynesia garlands have been habitually worn on seasons of “religious solemnity or social rejoicing,” and in Tonga they were employed as a token of respect. In short, wreaths seem to have been from a primitive period adopted almost universally in ceremonial rites, having found equal favour both with civilised as well as uncivilised communities. It will probably, too, always be so.

Flowers have always held a prominent place in wedding ceremonies, and at the present day are everywhere extensively used. Indeed, it would be no easy task to exhaust the list of flowers which have entered into the marriage customs of different countries, not to mention the many bridal emblems of which they have been made symbolical. As far back as the time of Juno, we read, according to Homer's graphic account, how:—

“Glad earth perceives, and from her bosom pours
Unbidden herbs and voluntary flowers:
Thick, new-born violets a soft carpet spread,
And clust'ring lotos swelled the rising bed;
And sudden hyacinths the earth bestrow,
And flamy crocus made the mountain glow.”

According to a very early custom the Grecian bride was required to eat a quince, and the hawthorn was the flower which formed her wreath, which at the present day is still worn at Greek nuptials, the altar being decked with its blossoms. Among the Romans the hazel held a significant position, torches having been burnt on the wedding evening to insure prosperity to the newly-married couple, and both in Greece and Rome young married couples were crowned with marjoram. At Roman weddings, too, oaken boughs were carried during the ceremony as symbols of fecundity; and the bridal wreath was of verbena, plucked by the bride herself. Holly wreaths were sent as tokens of congratulation, and wreaths of parsley and rue were given under a belief that they were effectual preservatives against evil spirits. In Germany, nowadays, a wreath of vervain is presented to the newly-married bride; a plant which, on account of its mystic virtues, was formerly much used for love-philtres and charms. The bride herself wears a myrtle wreath, as also does the Jewish maiden, but this wreath was never given either to a widow or a divorced woman. Occasionally, too, it is customary in Germany to present the bride and bridegroom with an almond at the wedding banquet, and in the nuptial ceremonies of the Czechs this plant is distributed among the guests. In Switzerland so much importance was in years past attached to flowers and their symbolical significance that, “a very strict law was in force prohibiting brides from wearing chaplets or garlands in the church, or at any time during the wedding feast, if they had previously in any way forfeited their rights to the privileges of maidenhood.”^[5] With the Swiss maiden the edelweiss is almost a sacred flower, being regarded as a proof of the devotion of her lover, by whom it is often gathered with much risk from growing in inaccessible spots. In Italy, as in days of old, nuts are scattered at the marriage festival, and corn is in many cases thrown over the bridal couple, a survival of the old Roman custom of making offerings of corn to the bride. A similar usage prevails at an Indian wedding, where, “after the first night, the mother of the husband, with all the female relatives, comes to the young bride and places on her head a measure of corn—emblem of fertility. The husband then comes forward and takes from his bride's head some handfuls of the grain, which he scatters over himself.” As a further illustration we may quote the old Polish custom, which consisted of visitors throwing wheat, rye, oats, barley, rice, and beans at the door of the bride's house, as a symbol that she never would want any of these grains so long as she did her duty. In the Tyrol is a fine grove of pine-trees—the result of a long-established custom for every newly united couple to plant a marriage tree, which is generally of the pine kind. Garlands of wild asparagus are used by the Boeotians, while with the Chinese the peach-blossom is the popular emblem of a bride.

In England, flowers have always been largely employed in the wedding ceremony, although they have varied at different periods, influenced by the caprice of fashion. Thus, it appears that flowers were once worn by the betrothed as tokens of their engagement, and Quarles in his “Sheapheard's Oracles,” 1646, tells us how,

“Love-sick swains
Compose rush-rings and myrtle-berry chains,
And stuck with glorious kingcups, and their bonnets
Adorn'd with laurell slips, chaunt their love sonnets.”

Spenser, too, in his “Shepherd's Calendar” for April, speaks of “Coronations and sops in wine worn of paramours”—sops in wine having been a nickname for pinks (*Dianthus plumarius*), although Dr. Prior assigns the name to *Dianthus caryophyllus*. Similarly willow was worn by a discarded lover. In the bridal crown, the rosemary often had a distinguished place, besides figuring at the ceremony itself, when it was, it would seem,

dipped in scented water, an allusion to which we find in Beaumont and Fletcher's "Scornful Lady," where it is asked, "Were the rosemary branches dipped?" Another flower which was entwined in the bridal garland was the lily, to which Ben Jonson refers in speaking of the marriage of his friend Mr. Weston with the Lady Frances Stuart:—

"See how with roses and with lilies shine,
Lilies and roses (flowers of either sex),
The bright bride's paths."

It was also customary to plant a rose-bush at the head of the grave of a deceased lover, should either of them die before the wedding. Sprigs of bay were also introduced into the bridal wreath, besides ears of corn, emblematical of the plenty which might always crown the bridal couple. Nowadays the bridal wreath is almost entirely composed of orange-blossom, on a background of maiden-hair fern, with a sprig of stephanotis interspersed here and there. Much uncertainty exists as to why this plant was selected, the popular reason being that it was adopted as an emblem of fruitfulness. According to a correspondent of *Notes and Queries*, the practice may be traced to the Saracens, by whom the orange-blossom was regarded as a symbol of a prosperous marriage—a circumstance which is partly to be accounted for by the fact that in the East the orange-tree bears ripe fruit and blossom at the same time.

Then there is the bridal bouquet, which is a very different thing from what it was in years gone by. Instead of being composed of the scarcest and most costly flowers arranged in the most elaborate manner, it was a homely nosegay of mere country flowers—some of the favourite ones, says Herrick, being pansy, rose, lady-smock, prick-madam, gentle-heart, and maiden-blush. A spray of gorse was generally inserted, in allusion, no doubt, to the time-honoured proverb, "When the furze is out of bloom, kissing is out of fashion." In spring-time again, violets and primroses were much in demand, probably from being in abundance at the season; although they have generally been associated with early death.

Among the many floral customs associated with the wedding ceremony may be mentioned the bridal-strewings, which were very prevalent in past years, a survival of which is still kept up at Knutsford, in Cheshire. On such an occasion, the flowers used were emblematical, and if the bride happened to be unpopular, she often encountered on her way to the church flowers of a not very complimentary meaning. The practice was not confined to this country, and we are told how in Holland the threshold of the newly-married couple was strewn with flowers, the laurel being as a rule most conspicuous among the festoons. Lastly, the use of flowers in paying honours to the dead has been from time immemorial most widespread. Instances are so numerous that it is impossible to do more than quote some of the most important, as recorded in our own and other countries. For detailed accounts of these funereal floral rites it would be necessary to consult the literature of the past from a very early period, and the result of such inquiries would form material enough for a goodly-sized volume.

Therespect for the dead among the early Greeks was very great, and Miss Lambert^[6] quotes the complaint of Petala to Simmalion, in the Epistles of Alciphron, to show how special was the dedication of flowers to the dead:—"I have a lover who is a mourner, not a lover; he sends me garlands and roses as if to deck a premature grave, and he says he weeps through the live-long night."

The chief flowers used by them for strewing over graves were the polyanthus, myrtle, and amaranth; the rose, it would appear from Anacreon, having been thought to possess a special virtue for the dead:—

"When pain afflicts and sickness grieves,
Its juice the drooping heart relieves;
And after death its odours shed
A pleasing fragrance o'er the dead."

And Electra is represented as complaining that the tomb of her father, Agamemnon, had not been duly adorned with myrtle—

"With no libations, nor with myrtle boughs,
Were my dear father's manes gratified."

The Greeks also planted asphodel and mallow round their graves, as the seeds of these plants were supposed to nourish the dead. Mourners, too, wore flowers at the funeral rites, and Homer relates how the Thessalians used crowns of amaranth at the burial of Achilles. The Romans were equally observant, and Ovid, when writing from the land of exile, prayed his wife—"But do you perform the funeral rites for me when dead, and offer chaplets wet with your tears. Although the fire shall have changed my body into ashes, yet the sad dust will be sensible of your pious affection." Like the Greeks, the Romans set a special value on the rose as a funeral flower, and actually left directions that their graves should be planted with this favourite flower, a custom said to have been introduced by them into this country. Both Camden and Aubrey allude to it, and at the present day in Wales white roses denote the graves of young unmarried girls.

Coming down to modern times, we find the periwinkle, nicknamed "death's flower," scattered over the graves of children in Italy—notably Tuscany—and in some parts of Germany the pink is in request for this purpose. In Persia we read of:—

"The basil-tuft that waves
Its fragrant blossoms over graves;"

And among the Chinese, roses, the anemone, and a species of lycoris are planted over graves. The Malays use a kind of basil, and in Tripoli tombs are adorned with such sweet and fragrant flowers as the orange, jessamine, myrtle, and rose. In Mexico the Indian carnation is popularly known as the "flower of the dead," and the people of Tahiti cover their dead with choice flowers. In America the Freemasons place twigs of acacia on the coffins of brethren. The Buddhists use flowers largely for funeral purposes, and an Indian name for the tamarisk is the "messenger of Yama," the Indian God of Death. The people of Madagascar have a species of mimosa, which is frequently found growing on the tombs, and in Norway the funeral plants are juniper and fir. In France the custom very largely nourishes, roses and orange-blossoms in the southern provinces being placed in the coffins of the young. Indeed, so general is the practice in France that, "sceptics and believers uphold it, and statesmen, and soldiers, and princes, and scholars equally with children and maidens are the objects of it."

Again, in Oldenburg, it is said that cornstalks must be scattered about a house in which death has entered, as a charm against further misfortune, and in the Tyrol an elder bush is often planted on a newly-made grave.

In our own country the practice of crowning the dead and of strewing their graves with flowers has prevailed from a very early period, a custom which has been most pathetically and with much grace described by Shakespeare in "Cymbeline" (Act iv. sc. 2):—

"With fairest flowers,
Whilst summer lasts, and I live here, Fidele,
I'll sweeten thy sad grave: thou shalt not lack
The flower that's like thy face, pale primrose; nor
The azured harebell, like thy veins; no, nor
The leaf of eglantine, whom not to slander,
Out-sweeten'd not thy breath: the ruddock would,
With charitable bill, O bill, sore-shaming
Those rich-left heirs that let their fathers lie
Without a monument! bring thee all this;
Yea, and furr'd moss besides, when flowers are none,
To winter-ground thy corse."

Allusions to the custom are frequently to be met with in our old writers, many of which have been collected together by Brand.^[7] In former years it was customary to carry sprigs of rosemary at a funeral, probably because this plant was considered emblematical of remembrance:—

"To show their love, the neighbours far and near,
Follow'd with wistful look the damsel's bier;

Spring'd rosemary the lads and lasses bore,
While dismally the parson walked before.”

Gay speaks of the flowers scattered on graves as “rosemary, daisy, butter'd flower, and endive blue,” and Pepys mentions a churchyard near Southampton where the graves were sown with sage. Another plant which has from a remote period been associated with death is the cypress, having been planted by the ancients round their graves. In our own country it was employed as a funeral flower, and Coles thus refers to it, together with the rosemary and bay:—

“Cypresse garlands are of great account at funerals amongst the gentler sort, but rosemary and bayes are used by the commons both at funerals and weddings. They are all plants which fade not a good while after they are gathered, and used (as I conceive) to intimate unto us that the remembrance of the present solemnity might not die presently (at once), but be kept in mind for many years.”

The yew has from time immemorial been planted in churchyards besides being used at funerals. Paris, in “Romeo and Juliet”, (Act v. sc. 3), says:—

“Under yon yew trees lay thee all along,
Holding thine ear close to the hollow ground;
So shall no foot upon the churchyard tread,
Being loose, unfirm, with digging up of graves,
But thou shall hear it.”

Shakespeare also refers to the custom of sticking yew in the shroud in the following song in “Twelfth Night” (Act ii. sc. 4):—

“My shroud of white, stuck all with yew,
Oh, prepare it;
My part of death, no one so true
Did share it.”

Unhappy lovers had garlands of willow, yew, and rosemary laid on their biers, an allusion to which occurs in the “Maid's Tragedy”:—

“Lay a garland on my hearse
Of the dismal yew;
Maidens, willow branches bear—
Say I died true.
My love was false, but I was firm
From my hour of birth;
Upon my buried body lie
Lightly, gentle earth.”

Among further funeral customs may be mentioned that of carrying a garland of flowers and sweet herbs before a maiden's coffin, and afterwards suspending it in the church. Nichols, in his “History of Lancashire” (vol. ii. pt. i. 382), speaking of Waltham in Framland Hundred, says: “In this church under every arch a garland is suspended, one of which is customarily placed there whenever any young unmarried woman dies.” It is to this custom Gay feelingly alludes:—

“To her sweet mem'ry flowing garlands strung,
On her now empty seat aloft were hung.”

Indeed, in all the ceremonial observances of life, from the cradle to the grave, flowers have formed a prominent feature, the symbolical meaning long attached to them explaining their selection on different occasions.

Footnotes:

1. See "Flower-lore," p. 147.
2. "The Ceremonial Use of Flowers."
3. *Fraser's Magazine*, 1870, p. 711.
4. "Flower-lore," pp. 149-50.
5. Miss Lambert, *Nineteenth Century*, May 1880, p. 821.
6. *Nineteenth Century*, September 1878, p. 473.
7. "Popular Antiquities," 1870, ii. 24, &c.

CHAPTER XIII. PLANT NAMES.

The origin and history of plant names is a subject of some magnitude, and is one that has long engaged the attention of philologists. Of the many works published on plant names, that of the "English Dialect Society"^[1] is by far the most complete, and forms a valuable addition to this class of literature.

Some idea of the wide area covered by the nomenclature of plants, as seen in the gradual evolution and descent of vernacular names, may be gathered even from a cursory survey of those most widely known in our own and other countries. Apart, too, from their etymological associations, it is interesting to trace the variety of sources from whence plant names have sprung, a few illustrations of which are given in the present chapter.

At the outset, it is noteworthy that our English plant names can boast of a very extensive parentage, being, "derived from many languages—Latin, Greek, ancient British, Anglo-Saxon, Norman, Low German, Swedish, Danish, Arabic, Persian."^[2] It is not surprising, therefore, that in many cases much confusion has arisen in unravelling their meaning, which in the course of years would naturally become more or less modified by a succession of influences such as the intercommunication and change of ideas between one country and another. On the other hand, numerous plant names clearly display their origin, the lapse of years having left these unaffected, a circumstance which is especially true in the case of Greek and Latin names. Names of French origin are frequently equally distinct, a familiar instance being dandelion, from the French *dent-de-lion*, "lion's tooth," although the reason for its being so called is by no means evident. At the same time, it is noticeable that in nearly every European language the plant bears a similar name; whereas Professor De Gubernatis connects the name with the sun (Helios), and adds that a lion was the animal symbol of the sun, and that all plants named after him are essentially plants of the sun.^[3] One of the popular names of the St. John's wort is tutsan, a corruption of the French *toute saine*, so called from its healing properties, and the mignonette is another familiar instance. The flower-de-luce, one of the names probably of the iris, is derived from *fleur de Louis*, from its having been assumed as his device by Louis VII. of France. It has undergone various changes, having been in all probability contracted into fleur-de-luce, and finally into fleur-de-lys or fleur-de-lis. An immense deal of discussion has been devoted to the history of this name, and a great many curious theories proposed in explanation of it, some being of opinion that the lily and not the iris is referred to. But the weight of evidence seem to favour the iris theory, this plant having been undoubtedly famous in French history. Once more, by some,^[4] the name fleur-de-lys has been derived from Loeks, in which manner the twelve first Louis signed their names, and which was easily contracted into Lys. Some consider it means the flower that grows on the banks of the river Lis, which separated France and Artois from Flanders. Turning to the literature of the past, Shakespeare has several allusions to the plant, as in "I Henry VI," where a messenger enters and exclaims:—

“Awake, awake, English nobility!
Let not sloth dim your honours new begot;
Cropp'd are the flower-de-luces in your arms;
Of England's coat one half is cut away.”

Spenser mentions the plant, and distinguishes it from the lily:—

“Show mee the groundes with daifadown-dillies,
And cowslips, and kingcups, and loved lillies;
The pretty pawnee,
And the cherisaunce,
Shall march with the fayre flowre delice.”

Another instance is the mignonette of our French neighbours, known also as the “love-flower.” One of the names of the deadly nightshade is belladonna which reminds us of its Italian appellation, and “several of our commonest plant names are obtained from the Low German or Dutch, as, for instance, buckwheat (*Polygonum fagopyrum*), from the Dutch *bockweit*.” The rowan-tree (*Pyrus aucuparia*) comes from the Danish *roeun*, Swedish *ruenn*, which, as Dr. Prior remarks, is traceable to the “old Norse *runa*, a charm, from its being supposed to have power to avert evil.” Similarly, the adder's tongue (*Ophioglossum vulgatum*) is said to be from the Dutch *adder-stong*, and the word hawthorn is found in the various German dialects.

As the authors of “English Plant Names” remark (Intr. xv.), many north-country names are derived from Swedish and Danish sources, an interesting example occurring in the word *kemps*, a name applied to the black heads of the ribwort plantain (*Plantago lanceolata*). The origin of this name is to be found in the Danish *kaempe*, a warrior, and the reason for its being so called is to be found in the game which children in most parts of the kingdom play with the flower-stalks of the plantain, by endeavouring to knock off the heads of each other's mimic weapons. Again, as Mr. Friend points out, the birch would take us back to the primeval forests of India, and among the multitudinous instances of names traceable to far-off countries may be mentioned the lilac and tulip from Persia, the latter being derived from *thoulyban*, the word used in Persia for a turban. Lilac is equivalent to *lilag*, a Persian word signifying flower, having been introduced into Europe from that country early in the sixteenth century by Busbeck, a German traveller. But illustrations of this land are sufficient to show from how many countries our plant names have been brought, and how by degrees they have become interwoven into our own language, their pronunciation being Anglicised by English speakers.

Many plants, again, have been called in memory of leading characters in days gone by, and after those who discovered their whereabouts and introduced them into European countries. Thus the fuchsia, a native of Chili, was named after Leonard Fuchs, a well-known German botanist, and the magnolia was so called in honour of Pierre Magnol, an eminent writer on botanical subjects. The stately dahlia after Andrew Dahl, the Swedish botanist. But, without enumerating further instances, for they are familiar to most readers, it may be noticed that plants which embody the names of animals are very numerous indeed. In many cases this has resulted from some fancied resemblance to some part of the animal named; thus from their long tongued-like leaves, the hart's-tongue, lamb's-tongue, and ox-tongue were so called, while some plants have derived their names from the snouts of certain animals, such as the swine's-snout (*Lentodon taraxacum*), and calf's-snout, or, as it is more commonly termed, snapdragon (*Antirrhinum majus*). The gaping corollas of various blossoms have suggested such names as dog's-mouth, rabbit's-mouth, and lion's-snap, and plants with peculiarly-shaped leaves have given rise to names like these—mouse-ear (*Stachys Zanaia*), cat's-ears, and bear's-ears. Numerous names have been suggested by their fancied resemblance to the feet, hoofs, and tails of animals and birds; as, for instance, colt's-foot, crow-foot, bird's-foot trefoil, horse-shoe vetch, bull-foot, and the vervain, nicknamed frog's-foot. Then there is the larkspur, also termed lark's-claw, and lark's-heel, the lamb's-toe being so called from its downy heads of flowers, and the horse-hoof from the shape of the leaf. Among various similar names may be noticed the crane's-bill and stork's-bill, from their long beak-like seed-vessels, and the valerian, popularly designated capon's-tail, from its spreading flowers.

Many plant names have animal prefixes, these indeed forming a very extensive list. But in some instances, “the name of an animal prefixed has a totally different signification, denoting size, coarseness, and frequently

worthlessness or spuriousness.” Thus the horse-parsley was so called from its coarseness as compared with smallage or celery, and the horse-mushroom from its size in distinction to a species more commonly eaten. The particular uses to which certain plants have been applied have originated their names: the horse-bean, from being grown as a food for horses; and the horse-chestnut, because used in Turkey for horses that are broken or touched in the wind. Parkinson, too, adds how, “horse-chestnuts are given in the East, and so through all Turkey, unto horses to cure them of the cough, shortness of wind, and such other diseases.” The germander is known as horse-chere, from its growing after horse-droppings; and the horse-bane, because supposed in Sweden to cause a kind of palsy in horses—an effect which has been ascribed by Linnaeus not so much to the noxious qualities of the plant itself, as to an insect (*Curculio paraplecticus*) that breeds in its stem.

The dog has suggested sundry plant names, this prefix frequently suggesting the idea of worthlessness, as in the case of the dog-violet, which lacks the sweet fragrance of the true violet, and the dog-parsley, which, whilst resembling the true plant of this name, is poisonous and worthless. In like manner there is the dog-elder, dog's-mercury, dog's-chamomile, and the dog-rose, each a spurious form of a plant quite distinct; while on the other hand we have the dog's-tooth grass, from the sharp-pointed shoots of its underground stem, and the dog-grass (*Triticum caninu*), because given to dogs as an aperient.

The cat has come in for its due share of plant names, as for instance the sun-spurge, which has been nicknamed cat's-milk, from its milky juice oozing in drops, as milk from the small teats of a cat; and the blossoms of the talix, designated cats-and-kittens, or kittings, probably in allusion to their soft, fur-like appearance. Further names are, cat's-faces (*Viola tricolor*), cat's-eyes (*Veronica chamcaedrys*), cat's-tail, the catkin of the hazel or willow, and cat's-ear (*Hypochaeris maculata*).

The bear is another common prefix. Thus there is the bear's-foot, from its digital leaf, the bear-berry, or bear's-bilberry, from its fruit being a favourite food of bears, and the bear's-garlick. There is the bear's-breech, from its roughness, a name transferred by some mistake from the Acanthus to the cow-parsnip, and the bear's-wort, which it has been suggested “is rather to be derived from its use in uterine complaints than from the animal.”

Among names in which the word cow figures may be mentioned the cow-bane, water-hemlock, from its supposed baneful effects upon cows, because, writes Withering, “early in the spring, when it grows in the water, cows often eat it, and are killed by it.” Cockayne would derive cowslip from *cu*, cow, and *shyppe*, lip, and cow-wheat is so nicknamed from its seed resembling wheat, but being worthless as food for man. The flowers of the *Arum maculatum* are “bulls and cows;” and in Yorkshire the fruit of *Crataegus oxyacantha* is bull-horns;—an old name for the horse-leek being bullock's-eye.

Many curious names have resulted from the prefix pig, as in Sussex, where the bird's-foot trefoil is known as pig's-pettitoes; and in Devonshire the fruit of the dog-rose is pig's-noses. A Northamptonshire term for goose-grass (*Galium aparine*) is pig-tail, and the pig-nut (*Brunium flexuosum*) derived this name from its tubers being a favourite food of pigs, and resembling nuts in size and flavour. The common cyclamen is sow-head, and a popular name for the *Sonchus oleraceus* is sow-thistle. Among further names also associated with the sow may be included the sow-fennel, sow-grass, and sow-foot, while the sow-bane (*Chenopodium rubrum*), is so termed from being, as Parkinson tells us, “found certain to kill swine.”

Among further animal prefixes may be noticed the wolfs-bane (*Aconitum napellus*), wolf's-claws (*Lycopodium clavatum*), wolf's-milk (*Euphorbia helioscopia*), and wolfs-thistle (*Carlina acaulis*). The mouse has given us numerous names, such as mouse-ear (*Hieracium pilosella*), mouse-grass (*Aira caryophyllea*), mouse-ear scorpion-grass (*Myosotis palustris*), mouse-tail (*Myosurus minimus*), and mouse-pea. The term rat-tail has been applied to several plants having a tail-like inflorescence, such as the *Plantago lanceolata* (ribwort plantain).

The term toad as a prefix, like that of dog, frequently means spurious, as in the toad-flax, a plant which, before it comes into flower, bears a tolerably close resemblance to a plant of the true flax. The frog, again, supplies names, such as frog's-lettuce, frog's-foot, frog-grass, and frog-cheese; while hedgehog gives us such names as hedgehog-parsley and hedgehog-grass.

Connected with the dragon we have the name dragon applied to the snake-weed (*Polygonum bistorta*), and dragon's-blood is one of the popular names of the Herb-Robert. The water-dragon is a nickname of the *Caltha palustris*, and dragon's-mouth of the *Digitalis purpurea*.

Once more, there is scorpion-grass and scorpion-wort, both of which refer to various species of *Myosotis*; snakes and vipers also adding to the list. Thus there is viper's-bugloss, and snake-weed. In Gloucestershire the fruit of the *Arum maculatum* is snake's-victuals, and snake's-head is a common name for the fritillary. There is the snake-skin willow and snake's-girdles;—snake's-tongue being a name given to the bane-wort (*Ranunculus flammula*).

Names in which the devil figures have been noticed elsewhere, as also those in which the words fairy and witch enter. As the authors, too, of the "Dictionary of Plant Names" have pointed out, a great number of names may be called dedicatory, and embody the names of many of the saints, and even of the Deity. The latter, however, are very few in number, owing perhaps to a sense of reverence, and "God Almighty's bread and cheese," "God's eye," "God's grace," "God's meat," "Our Lord's, or Our Saviour's flannel," "Christ's hair," "Christ's herb," "Christ's ladder," "Christ's thorn," "Holy Ghost," and "Herb-Trinity," make up almost the whole list. On the other hand, the Virgin Mary has suggested numerous names, some of which we have noticed in the chapter on sacred plants. Certain of the saints, again, have perpetuated their names in our plant nomenclature, instances of which are scattered throughout the present volume.

Some plants, such as flea-bane and wolf's-bane, refer to the reputed property of the plant to keep off or injure the animal named,^[5] and there is a long list of plants which derived their names from their real or imaginary medicinal virtues, many of which illustrate the old doctrine of signatures.

Birds, again, like animals, have suggested various names, and among some of the best-known ones may be mentioned the goose-foot, goose-grass, goose-tongue. Shakespeare speaks of cuckoo-buds, and there is cuckoo's-head, cuckoo-flower, and cuckoo-fruit, besides the stork's-bill and crane's-bill. Bees are not without their contingent of names; a popular name of the *Delphinium grandiflorum* being the bee-larkspur, "from the resemblance of the petals, which are studded with yellow hairs, to the humble-bee whose head is buried in the recesses of the flower." There is the bee-flower (*Ophrys apifera*), because the, "lip is in form and colour so like a bee, that any one unacquainted therewith would take it for a living bee sucking of the flower."

In addition to the various classes of names already mentioned, there are a rich and very varied assortment found in most counties throughout the country, many of which have originated in the most amusing and eccentric way. Thus "butter and eggs" and "eggs and bacon" are applied to several plants, from the two shades of yellow in the flower, and butter-churn to the *Nuphar luteum*, from the shape of the fruit. A popular term for *Nepeta glechoma* is "hen and chickens," and "cocks and hens" for the *Plantago lanceolata*. A Gloucestershire nickname for the *Plantago media* is fire-leaves, and the hearts'-ease has been honoured with all sorts of romantic names, such as "kiss me behind the garden gate;" and "none so pretty" is one of the popular names of the saxifrage. Among the names of the *Arum* may be noticed "parson in the pulpit," "cows and calves," "lords and ladies," and "wake-robin." The potato has a variety of names, such as leather-jackets, blue-eyes, and red-eyes.

A pretty name in Devonshire for the *Veronica chamcaedrys* is angel's-eyes:—

"Around her hat a wreath was twined
Of blossoms, blue as southern skies;
I asked their name, and she replied,
We call them angel's-eyes."^[6]

In the northern counties the poplar, on account of its bitter bark, was termed the bitter-weed.^[7]

"Oak, ash, and elm-tree,
The laird can hang for a' the three;

But fir, saugh, and bitter-weed,
The laird may flyte, but make naething be'et."

According to the compilers of "English Plant Names," "this name is assigned to no particular species of poplar, nor have we met with it elsewhere." The common Solomon's seal (*Polygonatum multiflorum*) has been nicknamed "David's harp,"^[8] and, "appears to have arisen from the exact similarity of the outline of the bended stalk, with its pendent bell-like blossoms, to the drawings of monkish times in which King David is represented as seated before an instrument shaped like the half of a pointed arch, from which are suspended metal bells, which he strikes with two hammers."

In the neighbourhood of Torquay, fir-cones are designated oysters, and in Sussex the Arabis is called "snow-on-the-mountain," and "snow-in-summer." A Devonshire name for the sweet scabiosis is the mournful-widow, and in some places the red valerian (*Centranthus ruber*) is known as scarlet-lightning. A common name for *Achillaea ptarmica* is sneezewort, and the *Petasites vulgaris* has been designated "son before the father." The general name for *Drosera rotundifolia* is sun-dew, and in Gloucestershire the *Primula auricula* is the tanner's-apron. The *Viola tricolor* is often known as "three faces in a hood," and the *Aconitum napellus* as "Venus's chariot drawn by two doves." The *Stellaria holostea* is "lady's white petticoat," and the *Scandix pecten* is "old wife's darning-needles." One of the names of the Campion is plum-pudding, and "spittle of the stars" has been applied to the *Nostoc commune*. Without giving further instances of these odd plant names, we would conclude by quoting the following extract from the preface of Mr. Earle's charming little volume on "English Plant Names," a remark which, indeed, most equally applies to other sections of our subject beyond that of the present chapter:—"The fascination of plant names has its foundation in two instincts, love of Nature, and curiosity about Language. Plant names are often of the highest antiquity, and more or less common to the whole stream of related nations. Could we penetrate to the original suggestive idea that called forth the name, it would bring valuable information about the first openings of the human mind towards Nature; and the merest dream of such a discovery invests with a strange charm the words that could tell, if we could understand, so much of the forgotten infancy of the human race."

Footnotes:

1. "Dictionary of English Plant Names," by J. Britten and Robert Holland. 1886.
2. "English Plant Names," Introduction, p. xiii.
3. See Folkard's "Legends," p. 309; Friend's "Flowers and Flowerlore," ii. 401-5.
4. See "Flower-lore," p. 74.
5. Friend's "Flower-lore," ii. 425.
6. *Garden*, June 29, 1872.
7. Johnston's "Botany of Eastern Borders," 1853, p. 177.
8. Lady Wilkinson's "Weeds and Wild Flowers," p. 269.

CHAPTER XIV. PLANT LANGUAGE.

Plant language, as expressive of the various traits of human character, can boast of a world-wide and antique history. It is not surprising that flowers, the varied and lovely productions of nature's dainty handiwork, should have been employed as symbolic emblems, and most aptly indicative oftentimes of what words when even most wisely chosen can ill convey; for as Tennyson remarks:—

“Any man that walks the mead
In bud, or blade, or bloom, may find
A meaning suited to his mind.”

Hence, whether we turn to the pages of the Sacred Volume, or to the early Greek writings, we find the symbolism of flowers most eloquently illustrated, while Persian poetry is rich in allusions of the same kind.

Indeed, as Mr. Ingram has remarked in his “*Flora Symbolica*,”^[1]—Every age and every clime has promulgated its own peculiar system of floral signs, and it has been said that the language of flowers is as old as the days of Adam; having, also, thousands of years ago, existed in the Indian, Egyptian, and Chaldean civilisations which have long since passed away. He further adds how the Chinese, whose, “chronicles antedate the historic records of all other nations, seem to have had a simple but complete mode of communicating ideas by means of florigraphic signs;” whereas, “the monuments of the old Assyrian and Egyptian races bear upon their venerable surfaces a code of floral telegraphy whose hieroglyphical meaning is veiled or but dimly guessed at in our day.” The subject is an extensive one, and also enters largely into the ceremonial use of flowers, many of which were purposely selected for certain rites from their long-established symbolical character. At the same time, it must be remembered that many plants have had a meaning attached to them by poets and others, who have by a license of their own made them to represent certain sentiments and ideas for which there is no authority save their own fancy.

Hence in numerous instances a meaning, wholly misguiding, has been assigned to various plants, and has given rise to much confusion. This, too, it may be added, is the case in other countries as well as our own.

Furthermore, as M. de Gubernatis observes, “there exist a great number of books which pretend to explain the language of flowers, wherein one may occasionally find a popular or traditional symbol; but, as a rule, these expressions are generally the wild fancies of the author himself.” Hence, in dealing with plant language, one is confronted with a host of handbooks, many of which are not only inaccurate, but misleading. But in enumerating the recognised and well-known plants that have acquired a figurative meaning, it will be found that in a variety of cases this may be traced to their connection with some particular event in years past, and not to some chance or caprice, as some would make us believe. The amaranth, for instance, which is the emblem of immortality, received its name, “never-fading,” from the Greeks on account of the lasting nature of its blossoms. Accordingly, Milton crowns with amaranth the angelic multitude assembled before the Deity:—

“To the ground,
With solemn adoration, down they cast
Their crowns, inwove with amaranth and gold.
Immortal amaranth, a flower which once
In Paradise, fast by the tree of life,
Began to bloom; but soon, for man's offence,
To heaven removed, where first it grew, there grows
And flowers aloft, shading the font of life,” &c.

And in some parts of the Continent churches are adorned at Christmas-tide with the amaranth, as a symbol “of that immortality to which their faith bids them look.”

Grass, from its many beneficial qualities, has been made the emblem of usefulness; and the ivy, from its persistent habit of clinging to the heaviest support, has been universally adopted as the symbol of confiding love and fidelity. Growing rapidly, it iron clasps:—

“The fissured stone with its entwining arms,
And embowers with leaves for ever green,
And berries dark.”

According to a Cornish tradition, the beautiful Iseult, unable to endure the loss of her betrothed—the brave Tristan—died of a broken heart, and was buried in the same church, but, by order of the king, the two graves were placed at a distance from each other. Soon, however, there burst forth from the tomb of Tristan a branch of

ivy, and another from the grave of Iseult; these shoots gradually growing upwards, until at last the lovers, represented by the clinging ivy, were again united beneath the vaulted roof of heaven.^[2]

Then, again, the cypress, in floral language, denotes mourning; and, as an emblem of woe, may be traced to the familiar classical myth of Cyparissus, who, sorrow-stricken at having slain his favourite stag, was transformed into a cypress tree. Its ominous and sad character is the subject of constant allusion, Virgil having introduced it into the funeral rites of his heroes. Shelley speaks of the unwept youth whom no mourning maidens decked,

“With weeping flowers, or votive cypress wreath,
The love-couch of his everlasting sleep.”

And Byron describes the cypress as,

“Dark tree! still sad when other's grief is fled,
The only constant mourner o'er the dead.”

The laurel, used for classic wreaths, has long been regarded emblematical of renown, and Tasso thus addresses a laurel leaf in the hair of his mistress:—

“O glad triumphant bough,
That now adornest conquering chiefs, and now
Clippeth the bows of over-ruling kings
From victory to victory.
Thus climbing on through all the heights of story,
From worth to worth, and glory unto glory,
To finish all, O gentle and royal tree,
Thou reignest now upon that flourishing head,
At whose triumphant eyes love and our souls are led.”

Like the rose, the myrtle is the emblem of love, having been dedicated by the Greeks and Romans to Venus, in the vicinity of whose temples myrtle-groves were planted; hence, from time immemorial,

“Sacred to Venus is the myrtle shade.”

This will explain its frequent use in bridal ceremonies on the Continent, and its employment for the wedding wreath of the Jewish damsel. Herrick, mindful of its associations, thus apostrophises Venus:—

“Goddess, I do love a girl,
Ruby lipp'd and toothed like pearl;
If so be I may but prove
Lucky in this maid I love,
I will promise there shall be
Myrtles offered up to thee.”

To the same goddess was dedicated the rose, and its world-wide reputation as “the flower of love,” in which character it has been extolled by poets in ancient and modern times, needs no more than reference here.

The olive indicates peace, and as an emblem was given to Judith when she restored peace to the Israelites by the death of Holofernes.^[3] Shakespeare, in “Twelfth Night” (Act i. sc. 5), makes Viola say:—“I bring no overture of war, no taxation of homage; I hold the olive in my hand; my words are as full of peace as of matter.” Similarly, the palm, which, as the symbol of victory, was carried before the conqueror in triumphal processions, is generally regarded as denoting victory. Thus, palm-branches were scattered in the path of Christ upon His public entry into Jerusalem; and, at the present day, a palm-branch is embroidered on the lappet of the gown of a French professor, to indicate that a University degree has been attained.^[4]

Some flowers have become emblematical from their curious characteristics. Thus, the balsam is held to be expressive of impatience, because its seed-pods when ripe curl up at the slightest touch, and dart forth their seeds, with great violence; hence one of its popular names, “touch-me-not.” The wild anemone has been considered indicative of brevity, because its fragile blossom is so quickly scattered to the wind and lost:—

“The winds forbid the flowers to flourish long,
Which owe to winds their name in Grecian song.”

The poppy, from its somniferous effects, has been made symbolic of sleep and oblivion; hence Virgil calls it the Lethean poppy, whilst our old pastoral poet, William Browne, speaks of it as “sleep-bringing poppy.” The heliotrope denotes devoted attachment, from its having been supposed to turn continually towards the sun; hence its name, signifying the *sun* and *to turn*. The classic heliotrope must not be confounded with the well-known Peruvian heliotrope or “cherry-pie,” a plant with small lilac-blue blossoms of a delicious fragrance. It would seem that many of the flowers which had the reputation of opening and shutting at the sun's bidding were known as heliotropes, or sunflowers, or turnesol. Shakespeare alludes to the,

“Marigold, that goes to bed with the sun,
And with him rises weeping.”

And Moore, describing its faithful constancy, says:—

“The sunflower turns on her god when he sets
The same look which she did when he rose.”

Such a flower, writes Mr. Ellacombe, was to old writers “the emblem of constancy in affection and sympathy in joy and sorrow,” though it was also the emblem of the fawning courtier, who can only shine when everything is right. Anyhow, the so-called heliotrope was the subject of constant symbolic allusion:—

“The flower, enamoured of the sun,
At his departure hangs her head and weeps,
And shrouds her sweetness up, and keeps
Sad vigils, like a cloistered nun,
Till his reviving ray appears,
Waking her beauty as he dries her tears.”^[5]

The aspen, from its tremulous motion, has been made symbolical of fear. The restless movement of its leaves is “produced by the peculiar form of the foot-stalks, and, indeed, in some degree, the whole tribe of poplars are subject to have their leaves agitated by the slightest breeze.”^[6] Another meaning assigned to the aspen in floral language is scandal, from an old saying which affirmed that its tears were made from women's tongues—an allusion to which is made in the subjoined rhyme by P. Hannay in the year 1622:—

“The quaking aspen, light and thin,
To the air quick passage gives;
Resembling still
The trembling ill
Of tongues of womankind,
Which never rest,
But still are prest
To wave with every wind.”

The almond, again, is regarded as expressive of haste, in reference to its hasty growth and early maturity; while the evening primrose, from the time of its blossoms expanding, indicates silent love—refraining from unclosing “her cup of paly gold until her lowly sisters are rocked into a balmy slumber.” The bramble, from its manner of growth, has been chosen as the type of lowliness; and “from the fierceness with which it grasps the passer-by with its straggling prickly stems, as an emblem of remorse.”

Fennel was in olden times generally considered an inflammatory herb, and hence to eat “conger and fennel” was to eat two high and hot things together, which was an act of libertinism. Thus in “2 Henry IV.” (Act ii. sc. 4), Falstaff says of Poin, “He eats conger and fennel.” Rosemary formerly had the reputation of strengthening the memory, and on this account was regarded as a symbol of remembrance. Thus, according to an old ballad:—

“Rosemary is for remembrance
Between us day and night,
Wishing that I may always have
You present in my sight.”

And in “Hamlet,” where Ophelia seems to be addressing Laertes, she says (Act iv. sc. 5):—

“There's rosemary, that's for remembrance.”

Vervain, from time immemorial, has been the floral symbol of enchantment, owing to its having been in ancient times much in request for all kinds of divinations and incantations. Virgil, it may be remembered, alludes to this plant as one of the charms used by an enchantress:—

“Bring running water, bind those altars round
With fillets, with vervain strew the ground.”

Parsley, according to floral language, has a double signification, denoting feasting and death. On festive occasions the Greeks wore wreaths of parsley, and on many other occasions it was employed, such as at the Isthmian games. On the other hand, this plant was strewn over the bodies of the dead, and decked their graves.

“The weeping willow,” as Mr. Ingram remarks, “is one of those natural emblems which bear their florigraphical meaning so palpably impressed that their signification is clear at first sight.” This tree has always been regarded as the symbol of sorrow, and also of forsaken love. In China it is employed in several rites, having from a remote period been regarded as a token of immortality. As a symbol of bitterness the aloe has long been in repute, and “as bitter as aloes” is a proverbial expression, doubtless derived from the acid taste of its juice. Eastern poets frequently speak of this plant as the emblem of bitterness; a meaning which most fitly coincides with its properties. The lily of the valley has had several emblems conferred upon it, each of which is equally apposite. Thus in reference to the bright hopeful season of spring, in which it blossoms, it has been regarded as symbolical of the return of happiness, whilst its delicate perfume has long been indicative of sweetness, a characteristic thus beautifully described by Keats:—

“No flower amid the garden fairer grows
Than the sweet lily of the lowly vale,
The queen of flowers.”

Its perfect snow-white flower is the emblem of purity, allusions to which we find numerous scattered in the literature of the past. One of the emblems of the white poplar in floral language is time, because its leaves appear always in motion, and “being of a dead blackish-green above, and white below,” writes Mr. Ingram, “they were deemed by the ancients to indicate the alternation of night and day.” Again, the plane-tree has been from early times made the symbol of genius and magnificence; for in olden times philosophers taught beneath its branches, which acquired for it a reputation as one of the seats of learning. From its beauty and size it obtained a figurative meaning; and the arbutus or strawberry-tree (*Arbutus unedo*) is the symbol of inseparable love, and the narcissus denotes self-love, from the story of Narcissus, who, enamoured of his own beauty, became spell-bound to the spot, where he pined to death. Shelley describes it as one of the flowers growing with the sensitive plant in that garden where:—

“The pied wind flowers and the tulip tall,
And narcissi, the fairest among them all,
Who gaze on their eyes in the stream's recess,
Till they die at their own dear loveliness.”

The sycamore implies curiosity, from Zacchaeus, who climbed up into this tree to witness the triumphal entry of Christ into Jerusalem; and from time immemorial the violet has been the emblem of constancy:—

“Violet is for faithfulness,
Which in me shall abide,
Hoping likewise that from your heart
You will not let it hide.”

In some cases flowers seem to have derived their symbolism from certain events associated with them. Thus the periwinkle signifies “early recollections, or pleasures of memory,” in connection with which Rousseau tells us how, as Madame Warens and himself were proceeding to Charmettes, she was struck by the appearance of some of these blue flowers in the hedge, and exclaimed, “Here is the periwinkle still in flower.”

Thirty years afterwards the sight of the periwinkle in flower carried his memory back to this occasion, and he inadvertently cried, “Ah, there is the periwinkle.” Incidents of the kind have originated many of the symbols found in plant language, and at the same time invested them with a peculiar historic interest.

Once more, plant language, it has been remarked, is one of those binding links which connects the sentiments and feelings of one country with another; although it may be, in other respects, these communities have little in common. Thus, as Mr. Ingram remarks in the introduction to his “*Flora Symbolica*” (p. 12), “from the unlettered North American Indian to the highly polished Parisian; from the days of dawning among the mighty Asiatic races, whose very names are buried in oblivion, down to the present times, the symbolism of flowers is everywhere and in all ages discovered permeating all strata of society. It has been, and still is, the habit of many peoples to name the different portions of the year after the most prominent changes of the vegetable kingdom.”

In the United States, the language of flowers is said to have more votaries than in any other part of the world, many works relative to which have been published in recent years. Indeed, the subject will always be a popular one; for further details illustrative of which the reader would do well to consult Mr. H.G. Adams's useful work on the “*Moral Language and Poetry of Flowers*,” not to mention the constant allusions scattered throughout the works of our old poets, such as Shakespeare, Chaucer, and Drayton.

Footnotes:

1. Introduction, p. 12.
2. Folkard's “Plant Legends,” p. 389.
3. See Judith xv. 13.
4. “Flower-lore,” pp. 197-8.
5. “Plant-lore of Shakespeare.”
6. “Flower-lore,” p. 168.

CHAPTER XV. FABULOUS PLANTS.

The curious traditions of imaginary plants found amongst most nations have partly a purely mythological origin. Frequently, too, they may be attributed to the exaggerated accounts given by old travellers, who, “influenced by a desire to make themselves famous, have gone so far as to pretend that they saw these fancied objects.” Anyhow, from whatever source sprung, these productions of ignorance and superstition have from a very early period been firmly credited. But, like the accounts given us of fabulous animals, they have long ago been acknowledged as survivals of popular errors, which owed their existence to the absence of botanical knowledge.

We have elsewhere referred to the great world tree, and of the primitive idea of a human descent from trees. Indeed, according to the early and uncultured belief of certain communities, there were various kinds of animal-producing trees, accounts of which are very curious. Among these may be mentioned the vegetable lamb, concerning which olden writers have given the most marvellous description. Thus Sir John Maundeville, who in his “Voyage and Travel” has recorded many marvellous sights which either came under his notice, or were reported to him during his travels, has not omitted to speak of this remarkable tree. Thus, to quote his words:—“There groweth a manner of fruit as though it were gourdes; and when they be ripe men cut them in two, and men find within a little beast, in flesh, in bone, and blood—as though it were a little lamb withouten wolfe—and men eat both the fruit and the beast, and that is a great marvel; of that fruit I have eaten although it were wonderful; but that I know well that God is marvellous in His works.” Various accounts have been given of this wondrous plant, and in Parkinson's “Paradisus” it is represented as one of the plants which grew in the Garden of Eden. Its local name is the Scythian or Tartarian Lamb; and, as it grows, it might at a short distance be taken for an animal rather than a vegetable production. It is one of the genus *Polypodium*; root decumbent, thickly clothed with a very soft close hoar, of a deep yellow colour. It is also called by the Tartars “Barometz,” and a Chinese nickname is “Rufous dog.” Mr. Bell, in his “Journey to Ispahan,” thus describes a specimen which he saw:—“It seemed to be made by art to imitate a lamb. It is said to eat up and devour all the grass and weeds within its reach. Though it may be thought that an opinion so very absurd could never find credit with people of the meanest understanding, yet I have conversed with some who were much inclined to believe it; so very prevalent is the prodigious and absurd with some part of mankind. Among the more sensible and experienced Tartars, I found they laughed at it as a ridiculous fable.” Blood was said to flow from it when cut or injured, a superstition which probably originated in the fact that the fresh root when cut yields a tenacious gum like the blood of animals. Dr. Darwin, in his “Lives of the Plants,” adopts the fable thus:—

“E'en round the pole the flames of love aspire,
 And icy bosoms feel the sacred fire,
 Cradled in snow, and fanned by arctic air,
 Shines, gentle Barometz, the golden hair;
 Rested in earth, each cloven hoof descends,
 And round and round her flexile neck she bends.
 Crops of the grey coral moss, and hoary thyme,
 Or laps with rosy tongue the melting rime,
 Eyes with mute tenderness her distant dam,
 Or seems to bleat a vegetable lamb.”

Another curious fiction prevalent in olden times was that of the barnacle-tree, to which Sir John Maundeville also alludes:—“In our country were trees that bear a fruit that becomes flying birds; those that fell in the water lived, and those that fell on the earth died, and these be right good for man's meat.” As early as the twelfth century this idea was promulgated by Giraldus Cambrensis in his “Topographia Hiberniae,” and Gerard in his “Herball, or General History of Plants,” published in the year 1597, narrates the following:—“There are found in the north parts of Scotland, and the isles adjacent, called Orcades, certain trees, whereon do grow small fishes, of a white colour, tending to russet, wherein are contained little living creatures; which shells, in time of maturity, do open, and out of them grow those little living things which, falling into the water, do become fowls, whom we call barnacles, in the north of England brant-geese, and in Lancashire tree-geese; but the others that do fall upon the land perish, and do come to nothing.” But, like many other popular fictions, this notion was founded on truth, and probably originated in mistaking the fleshy peduncle of the barnacle (*Lepas analifera*) for the neck of a goose, the shell for its head, and the tentacula for a tuft of feather. There were many versions of this eccentric myth, and according to one modification given by Boece, the oldest Scottish historian, these barnacle-geese are first produced in the form of worms in old trees, and further adds that such a tree was cast on shore in the year 1480, when there appeared, on its being sawn asunder, a multitude of worms, “throwing themselves out of sundry holes and pores of the tree; some of them were nude, as they were new shapen; some had both head, feet, and wings, but they had no feathers; some of them were perfect shapen fowls. At last, the people having this tree each day in more admiration, brought it to the kirk of St. Andrew's, beside the town of Tyre, where it yet remains to our day.”

Du Bartas thus describes the various transformations of this bird:—

“So, slowe Bootes underneath him sees,
In th' ycie iles, those goslings hatcht of trees;
Whose fruitful leaves, falling into the water,
Are turn'd, they say, to living fowls soon after.

So, rotten sides of broken ships do change
To barnacles; O transformation change,
'Twas first a green tree, then a gallant hull,
Lately a mushroom, now a flying gull.”

Meyer wrote a treatise on this strange “bird without father or mother,” and Sir Robert Murray, in the “Philosophical Transactions,” says that, “these shells are hung at the tree by a neck, longer than the shell, of a filmy substance, round and hollow and creased, not unlike the windpipe of a chicken, spreading out broadest where it is fastened to the tree, from which it seems to draw and convey the matter which serves for the growth and vegetation of the shell and the little bird within it. In every shell that I opened,” he adds, “I found a perfect sea-fowl; the little bill like that of a goose, the eyes marked; the head, neck, breast, wing, tail, and feet formed; the feathers everywhere perfectly shaped, and the feet like those of other water-fowl.” The Chinese have a tradition of certain trees, the leaves of which were finally changed into birds.

With this story may be compared that of the oyster-bearing tree, which Bishop Fleetwood describes in his “Curiosities of Agriculture and Gardening,” written in the year 1707. The oysters as seen, he says, by the Dominican Du Tertre, at Guadaloupe, grew on the branches of trees, and, “are not larger than the little English oysters, that is to say, about the size of a crown-piece. They stick to the branches that hang in the water of a tree called Paretuvier. No doubt the seed of the oysters, which is shed in the tree when they spawn, cleaves to those branches, so that the oysters form themselves there, and grow bigger in process of time, and by their weight bend down the branches into the sea, and then are refreshed twice a day by the flux and reflux of it.” Kircher speaks of a tree in Chili, the leaves of which brought forth a certain kind of worm, which eventually became changed into serpents; and describes a plant which grew in the Molucca Islands, nicknamed “catopa,” on account of its leaves when falling off being transformed into butterflies.

Among some of the many other equally wonderful plants may be mentioned the “stony wood,” which is thus described by Gerarde:—“Being at Rugby, about such time as our fantastic people did with great concourse and multitudes repair and run headlong unto the sacred wells of Newnam Regis, in the edge of Warwickshire, as unto the Waters of Life, which could cure all diseases.” He visited these healing-wells, where he, “found growing over the same a fair ash-tree, whose boughs did hang over the spring of water, whereof some that were seare and rotten, and some that of purpose were broken off, fell into the water and were all turned into stone. Of these, boughs, or parts of the tree, I brought into London, which, when I had broken into pieces, therein might be seen that the pith and all the rest was turned into stones, still remaining the same shape and fashion that they were of before they were in the water.” Similarly, Sir John Maundeville notices the “Dead Sea fruit”—fruit found on the apple-trees near the Dead Sea. To quote his own words:—“There be full fair apples, and fair of colour to behold; but whoso breaketh them or cutteth them in two, he shall find within them coals and cinders, in token that by the wrath of God, the city and the land were burnt and sunken into hell.” Speaking of the many legendary tales connected with the apple, may be mentioned the golden apples which Hera received at her marriage with Zeus, and placed under the guardianship of the dragon Ladon, in the garden of the Hesperides. The northern Iduna kept guarded the sacred apples which, by a touch, restored the aged gods to youth; and according to Sir J. Maundeville, the apples of Pyban fed the pigmies with their smell only. This reminds us of the singing apple in the fairy romance, which would persuade by its smell alone, and enable the possessor to write poetry or prose, and to display the most accomplished wit; and of the singing tree in the “Arabian Nights,” each leaf of which was musical, all the leaves joining together in a delightful harmony.

But peculiarities of this kind are very varied, and form an extensive section in “Plant-lore;”—very many curious examples being found in old travels, and related with every semblance of truth. In some instances trees have

obtained a fabulous character from being connected with certain events. Thus there was the “bleeding tree.”^[1] It appears that one of the indictments laid to the charge of the Marquis of Argyll was this:—“That a tree on which thirty-six of his enemies were hanged was immediately blasted, and when hewn down, a copious stream of blood ran from it, saturating the earth, and that blood for several years was emitted from the roots.” Then there is the “poet's tree,” which grows over the tomb of Tan-Sein, a musician at the court of Mohammed Akbar. Whoever chews a leaf of this tree was long said to be inspired with sweet melody of voice, an allusion to which is made by Moore, in “Lalla Kookh.”:—“His voice was sweet, as if he had chewed the leaves of that enchanted tree which grows over the tomb of the musician Tan-Sein.”

The rare but occasional occurrence of vegetation in certain trees and shrubs, happening to take place at the period of Christ's birth, gave rise to the belief that such trees threw out their leaves with a holy joy to commemorate that anniversary. An oak of the early budding species for two centuries enjoyed such a notoriety, having been said to shoot forth its leaves on old Christmas Day, no leaf being seen either before or after that day during winter. There was the famous Glastonbury thorn, and in the same locality a walnut tree was reported never to put forth its leaves before the feast of St. Barnabas, the 11th June. The monkish legend runs thus: Joseph of Arimathaea, after landing at no great distance from Glastonbury, walked to a hill about a mile from the town. Being weary he sat down here with his companions, the hill henceforth being nicknamed “Weary-All-Hill,” locally abbreviated into “Werral.” Whilst resting Joseph struck his staff into the ground, which took root, grew, and blossomed every Christmas Day. Previous to the time of Charles I a branch of this famous tree was carried in procession, with much ceremony, at Christmas time, but during the Civil War the tree was cut down.

Many plants, again, as the “Sesame” of the “Arabian Nights,” had the power of opening doors and procuring an entrance into caverns and mountain sides—a survival of which we find in the primrose or key-flower of German legend. Similarly, other plants, such as the golden-rod, have been renowned for pointing to hidden springs of water, and revealing treasures of gold and silver. Such fabulous properties have been also assigned to the hazel-branch, popularly designated the divining-rod:—

“Some sorcerers do boast they have a rod,
Gather'd with vows and sacrifice,
And, borne aloft, will strangely nod
The hidden treasure where it lies.”

With plants of the kind we may compare the wonder-working moonwort (*Botrychium lunaria*), which was said to open locks and to unshoe horses that trod on it, a notion which Du Bartas thus mentions in his “Divine Weekes”—

“Horses that, feeding on the grassy hills,
Tread upon moonwort with their hollow heels,
Though lately shod, at night go barefoot home,
Their maister musing where their shoes become.
O moonwort! tell me where thou bid'st the smith,
Hammer and pinchers, thou unshodd'st them with.

Alas! what lock or iron engine is't,
That can thy subtle secret strength resist,
Still the best farrier cannot set a shoe
So sure, but thou (so shortly) canst undo.”

The blasting-root, known in Germany as spring-wurzel, and by us as spring-wort, possesses similar virtues, for whatever lock is touched by it must yield. It is no easy matter to find this magic plant, but, according to a piece of popular folk-lore, it is obtained by means of the woodpecker. When this bird visits its nest, it must have been previously plugged up with wood, to remove which it goes in search of the spring-wort. On holding this before the nest the wood shoots out from the tree as if driven by the most violent force. Meanwhile, a red cloth must be placed near the nest, which will so scare the woodpecker that it will let the fabulous root drop. There are several

versions of this tradition. According to Pliny the bird is the raven; in Swabia it is the hoopoe, and in Switzerland the swallow. In Russia, there is a plant growing in marshy land, known as the rasir-trava, which when applied to locks causes them to open instantly. In Iceland similar properties are ascribed to the herb-paris, there known as lasa-grass.

According to a piece of Breton lore, the selago, or “cloth of gold,” cannot be cut with steel without the sky darkening and some disaster taking place:—

“The herb of gold is cut; a cloud
Across the sky hath spread its shroud
To war.”

On the other hand, if properly gathered with due ceremony, it conferred the power of understanding the language of beast or bird.^[2] As far back as the time of Pliny, we have directions for the gathering of this magic plant. The person plucking it was to go barefoot, with feet washed, clad in white, after having offered a sacrifice of bread and wine. Another plant which had to be gathered with special formalities was the magic mandragora. It was commonly reported to shriek in such a hideous manner when pulled out of the earth that,

“Living mortals hearing them run mad.”

Hence, various precautions were adopted. According to Pliny, “When they intended to take up the root of this plant, they took the wind thereof, and with a sword describing three circles about it, they dugged it up, looking towards the west.” Another old authority informs us that he “Who would take it up, in common prudence should tie a dog to it to accomplish his purpose, as if he did it himself, he would shortly die.” Moore gives this warning:

“The phantom shapes—oh, touch them not
That appal the maiden's sight,
Look in the fleshy mandrake's stem,
That shrieks when plucked at night.”

To quote one or two more illustrations, we may mention the famous lily at Lauenberg, which is said to have sprung up when a poor and beautiful girl was spirited away out of the clutches of a dissolute baron. It made its appearance annually, an event which was awaited with much interest by the inhabitants of the Hartz, many of whom made a pilgrimage to behold it. “They returned to their homes,” it is said, “overpowered by its dazzling beauty, and asserting that its splendour was so great that it shed beams of light on the valley below.”

Similarly, we are told how the common break-fern flowers but once a year, at midnight, on Michaelmas Eve, when it displays a small blue flower, which vanishes at the approach of dawn. According to a piece of folk-lore current in Bohemia and the Tyrol, the fern-seed shines like glittering gold at the season, so that there is no chance of missing its appearance, especially as it has its sundry mystic properties which are described elsewhere.

Professor Mannhardt relates a strange legend current in Mecklenburg to the effect that in a certain secluded and barren spot, where a murder had been committed, there grows up every day at noon a peculiarly-shaped thistle, unlike any other of its kind. On inspection there are to be seen human arms, hands, and heads, and as soon as twelve heads have appeared, the weird plant vanishes. It is further added that on one occasion a shepherd happened to pass the mysterious spot where the thistle was growing, when instantly his arms were paralysed and his staff became tinder. Accounts of these fabulous trees and plants have in years gone been very numerous, and have not yet wholly died out, surviving in the legendary tales of most countries. In some instances, too, it would seem that certain trees like animals have gained a notoriety, purely fabulous, through trickery and credulity. About the middle of the last century, for instance, there was the groaning-tree at Badesly, which created considerable sensation. It appears that a cottager, who lived in the village of Badesly, two miles from Lymington, frequently heard a strange noise behind his house, like a person in extreme agony. For about twenty months this tree was an object of astonishment, and at last the owner of the tree, in order to discover the cause of its supposed sufferings, bored a hole in the trunk. After this operation it ceased to groan, it was rooted up, but

nothing appeared to account for its strange peculiarity. Stories of this kind remind us of similar wonders recorded by Sir John Maundeville, as having been seen by him in the course of his Eastern travels. Thus he describes a certain table of ebony or blackwood, “that once used to turn into flesh on certain occasions, but whence now drops only oil, which, if kept above a year, becomes good flesh and bone.”

Footnotes:

1. Laing's “History of Scotland,” 1800, ii. p. II.
2. “Flower-lore,” p. 46.

CHAPTER XVI. DOCTRINE OF SIGNATURES.

The old medical theory, which supposed that plants by their external character indicated the particular diseases for which Nature had intended them as remedies, was simply a development of the much older notion of a real connection between object and image. Thus, on this principle, it was asserted that the properties of substances were frequently denoted by their colour; hence, white was regarded as refrigerant, and red as hot. In the same way, for disorders of the blood, burnt purple, pomegranate seeds, mulberries, and other red ingredients were dissolved in the patient's drink; and for liver complaints yellow substances were recommended. But this fanciful and erroneous notion “led to serious errors in practice,”^[1] and was occasionally productive of the most fatal results. Although, indeed, Pliny spoke of the folly of the magicians in using the catanance (Greek: katanhankae, compulsion) for love-potions, on account of its shrinking “in drying into the shape of the claws of a dead kite,”^[2] and so holding the patient fast; yet this primitive idea, after the lapse of centuries, was as fully credited as in the early days when it was originally started. Throughout the sixteenth and seventeenth centuries, for instance, it is noticed in most medical works, and in many cases treated with a seriousness characteristic of the backward state of medical science even at a period so comparatively recent. Crollius wrote a work on the subject; and Langham, in his “Garden of Health,” published in the year 1578, accepted the doctrine. Coles, in his “Art of Simpling” (1656), thus describes it:—

“Though sin and Satan have plunged mankind into an ocean of infirmities, yet the mercy of God, which is over all His workes, maketh grasse to growe upon the mountains and herbes for the use of men, and hath not only stamped upon them a distinct forme, but also given them particular signatures, whereby a man may read even in legible characters the use of them.”

John Ray, in his treatise on “The Wisdom of God in Creation,” was among the first to express his disbelief of this idea, and writes:—“As for the signatures of plants, or the notes impressed upon them as notices of their virtues, some lay great stress upon them, accounting them strong arguments to prove that some understanding principle is the highest original of the work of Nature, as indeed they were could it be certainly made to appear that there were such marks designedly set upon them, because all that I find mentioned by authors seem to be rather fancied by men than designed by Nature to signify, or point out, any such virtues, or qualities, as they would make us believe.” His views, however, are somewhat contradictory, inasmuch as he goes on to say that, “the noxious and malignant plants do, many of them, discover something of their nature by the sad and melancholick visage of their leaves, flowers, or fruit. And that I may not leave that head wholly untouched, one observation I shall add relating to the virtues of plants, in which I think there is something of truth—that is, that there are of the wise dispensation of Providence such species of plants produced in every country as are made proper and convenient for the meat and medicine of the men and animals that are bred and inhabit therein.” Indeed, however much many of the botanists of bygone centuries might try to discredit this popular delusion, they do not seem to have been wholly free from its influence themselves. Some estimate, also, of the prominence which the doctrine of signatures obtained may be gathered from the frequent allusions to it in the literature of the period. Thus, to take one illustration, the euphrasia or eye-bright (*Euphrasia officinalis*), which was, and is, supposed to be good for the eye, owing to a black pupil-like spot in its corolla, is noticed by Milton, who, it may be remembered, represents the archangel as clearing the vision of our first parents by its means:—

“Then purged with euphrasy and rue
His visual orbs, for he had much to see.”

Spenser speaks of it in the same strain:—

“Yet euphrasie may not be left unsung,
That gives dim eyes to wander leagues around.”

And Thomson says:—

“If she, whom I implore, Urania, deign
With euphrasy to purge away the mists,
Which, humid, dim the mirror of the mind.”

With reference to its use in modern times, Anne Pratt^[3] tells us how, “on going into a small shop in Dover, she saw a quantity of the plant suspended from the ceiling, and was informed that it was gathered and dried as being good for weak eyes;” and in many of our rural districts I learn that the same value is still attached to it by the peasantry.

Again, it is interesting to observe how, under a variety of forms, this piece of superstition has prevailed in different parts of the world. By virtue of a similar association of ideas, for instance, the gin-seng^[4] was said by the Chinese and North American Indians to possess certain virtues which were deduced from the shape of the root, supposed to resemble the human body^[5]—a plant with which may be compared our mandrake. The Romans of old had their rock-breaking plant called “saxifraga” or *sassafras*;^[6] and we know in later times how the granulated roots of our white meadow saxifrage (*Saxifraga granulata*), resembling small stones, were supposed to indicate its efficacy in the cure of calculous complaints. Hence one of its names, stonebreak. The stony seeds of the gromwell were, also, used in cases of stone—a plant formerly known as lichwale, or, as in a MS. of the fifteenth century, lythewale, stone-switch.^[7]

In accordance, also, with the same principle it was once generally believed that the seeds of ferns were of an invisible sort, and hence, by a transference of properties, it came to be admitted that the possessor of fern-seed could likewise be invisible—a notion which obtained an extensive currency on the Continent. As special good-luck was said to attend the individual who succeeded in obtaining this mystic seed, it was eagerly sought for—Midsummer Eve being one of the occasions when it could be most easily procured. Thus Grimm, in his “Teutonic Mythology,”^[8] relates how a man in Westphalia was looking on Midsummer night for a foal he had lost, and happened to pass through a meadow just as the fern-seed was ripening, so that it fell into his shoes. In the morning he went home, walked into the sitting-room and sat down, but thought it strange that neither his wife nor any of the family took the least notice of him. “I have not found the foal,” said he. Thereupon everybody in the room started and looked alarmed, for they heard his voice but saw him not. His wife then called him, thinking he must have hid himself, but he only replied, “Why do you call me? Here I am right before you.” At last he became aware that he was invisible, and, remembering how he had walked in the meadow on the preceding evening, it struck him that he might possibly have fern-seed in his shoes. So he took them off, and as he shook them the fern-seed dropped out, and he was no longer invisible. There are numerous stories of this kind; and, according to Dr. Kuhn, one method for obtaining the fern-seed was, at the summer solstice, to shoot at the sun when it had attained its midday height. If this were done, three drops of blood would fall, which were to be gathered up and preserved—this being the fern-seed. In Bohemia,^[9] on old St. John's Night (July 8), one must lay a communion chalice-cloth under the fern, and collect the seed which will fall before sunrise. Among some of the scattered allusions to this piece of folk-lore in the literature of our own country, may be mentioned one by Shakespeare in “I Henry IV.” (ii. 1):—

“*Gadshill*. We have the receipt of fern-seed, we walk invisible——”^[10]

“*Chamberlain*. Nay, by my faith, I think you are more beholding to the night than to fern-seed for your walking invisible.”

In Ben Jonson's “New Inn” (i. 1), it is thus noticed:—

“I had
No medicine, sir, to go invisible,
No fern-seed in my pocket.”

Brand ^[11] was told by an inhabitant of Heston, in Middlesex, that when he was a young man he was often present at the ceremony of catching the fern-seed at midnight, on the eve of St. John Baptist. The attempt was frequently unsuccessful, for the seed was to fall into a plate of its own accord, and that too without shaking the plate. It is unnecessary to add further illustrations on this point, as we have had occasion to speak elsewhere of the sundry other magical properties ascribed to the fern-seed, whereby it has been prominently classed amongst the mystic plants. But, apart from the doctrine of signatures, it would seem that the fern-seed was also supposed to derive its power of making invisible from the cloud, says Mr. Kelly, ^[12] “that contained the heavenly fire from which the plant is sprung.” Whilst speaking, too, of the fern-seed's property of making people invisible, it is of interest to note that in the Icelandic and Pomeranian myths the schamir or “raven-stone” renders its possessor invisible; and according to a North German tradition the luck-flower is imbued with the same wonderful qualities. It is essential, however, that the flower be found by accident, for he who seeks it never finds it. In Sweden hazel-nuts are reputed to have the power of making invisible, and from their reputed magical properties have been, from time immemorial, in great demand for divination. All those plants whose leaves bore a fancied resemblance to the moon were, in days of old, regarded with superstitious reverence. The moon-daisy, the type of a class of plants resembling the pictures of a full moon, were exhibited, says Dr. Prior, “in uterine complaints, and dedicated in pagan times to the goddess of the moon.” The moonwort (*Botrychium lunaria*), often confounded with the common “honesty” (*Lunaria biennis*) of our gardens, so called from the semi-lunar shape of the segments of its frond, was credited with the most curious properties, the old alchemists affirming that it was good among other things for converting quicksilver into pure silver, and unshoeing such horses as trod upon it. A similar virtue was ascribed to the horse-shoe vetch (*Hippocrepis comosa*), so called from the shape of the legumes, hence another of its mystic nicknames was “unshoe the horse.”

But referring to the doctrine of signatures in folk-medicine, a favourite garden flower is Solomon's seal (*Polygonatum multiflorum*). On cutting the roots transversely, some marks are apparent not unlike the characters of a seal, which to the old herbalists indicated its use as a seal for wounds. ^[13] Gerarde, describing it, tells us how, “the root of Solomon's seal stamped, while it is fresh and greene, and applied, taketh away in one night, or two at the most, any bruise, black or blue spots, gotten by falls, or women's wilfulness in stumbling upon their hasty husbands' fists.” For the same reason it was called by the French herbalists “l'herbe de la rupture.” The specific name of the tutsan ^[14] (*Hypericum androsoemum*), derived from the two Greek words signifying man and blood, in reference to the dark red juice which exudes from the capsules when bruised, was once applied to external wounds, and hence it was called “balm of the warrior's wound,” or “all-heal.” Gerarde says, “The leaves laid upon broken skins and scabbed legs heal them, and many other hurts and griefs, whereof it took its name 'toute-saine' of healing all things.” The pretty plant, herb-robert (*Geranium robertianum*), was supposed to possess similar virtues, its power to arrest bleeding being indicated by the beautiful red hue assumed by the fading leaves, on account of which property it was styled “a stauncher of blood.” The garden Jerusalem cowslip (*Pulmonaria officinalis*) owes its English name, lungwort, to the spotting of the leaves, which were said to indicate that they would be efficacious in healing diseases of the lungs. Then there is the water-soldier (*Stratiotes aloides*), which from its sword-shaped leaves was reckoned among the appliances for gun-shot wounds. Another familiar plant which has long had a reputation as a vulnerary is the self-heal, or carpenter's herb (*Prunella vulgaris*), on account of its corolla being shaped like a bill-hook.

Again, presumably on the doctrine of signatures, the connection between roses and blood is very curious. Thus in France, Germany, and Italy it is a popular notion that if one is desirous of having ruddy cheeks, he must bury a drop of his blood under a rose-bush. ^[15] As a charm against haemorrhage of every kind, the rose has long been

a favourite remedy in Germany, and in Westphalia the following formula is employed: “Abek, Wabek, Fabek; in Christ's garden stand three red roses—one for the good God, the other for God's blood, the third for the angel Gabriel: blood, I pray you, cease to flow.” Another version of this charm is the following ^[16]:—“On the head of our Lord God there bloom three roses: the first is His virtue, the second is His youth, the third is His will. Blood, stand thou in the wound still, so that thou neither sore nor abscess givest.”

Turning to some of the numerous plants which on the doctrine of signatures were formerly used as specifics from a fancied resemblance, in the shape of the root, leaf, or fruit, to any particular part of the human body, we are confronted with a list adapted for most of the ills to which the flesh is heir. ^[17] Thus, the walnut was regarded as clearly good for mental cases from its bearing the signature of the whole head; the outward green cortex answering to the pericranium, the harder shell within representing the skull, and the kernel in its figure resembling the cover of the brain. On this account the outside shell was considered good for wounds of the head, whilst the bark of the tree was regarded as a sovereign remedy for the ringworm. ^[18] Its leaves, too, when bruised and moistened with vinegar were used for ear-ache. For scrofulous glands, the knotty tubers attached to the kernel-wort (*Scrophularia nodosa*) have been considered efficacious. The pith of the elder, when pressed with the fingers, “doth pit and receive the impress of them thereon, as the legs and feet of dropsical persons do,” Therefore the juice of this tree was reckoned a cure for dropsy. Our Lady's thistle (*Cardmis Marianus*), from its numerous prickles, was recommended for stitches of the side; and nettle-tea is still a common remedy with many of our peasantry for nettle-rash. The leaves of the wood-sorrel (*Oxalis acetosella*) were believed to preserve the heart from many diseases, from their being “broad at the ends, cut in the middle, and sharp towards the stalk.” Similarly the heart-trefoil, or clover (*Medicago maculata*), was so called, because, says Coles in his “Art of Simpling,” “not only is the leaf triangular like the heart of a man, but also because each leaf contains the perfect image of an heart, and that in its proper colour—a flesh colour. It defendeth the heart against the noisome vapour of the spleen.” Another plant which, on the same principle, was reckoned as a curative for heart-disease, is the heart's-ease, a term meaning a *cordial*, as in Sir Walter Scott's “Antiquary” (chap. xi.), “try a dram to be eilding and claise, and a supper and heart's-ease into the bargain.” The knot-grass (*Polygonum aviculare*), with its reddish-white flowers and trailing pointed stems, was probably so called “from some unrecorded character by the doctrine of signatures,” Suggests Mr. Ellacombe, ^[19] that it would stop the growth of children. Thus Shakespeare, in his “Midsummer Night's Dream” (Act iii. sc. 2), alludes to it as the “hindering knot-grass,” and in Beaumont and Fletcher's “Coxcomb” (Act ii. sc. 2) it is further mentioned:—

“We want a boy extremely for this function,
Kept under for a year with milk and knot-grass.”

According to Crollius, the woody scales of which the cones of the pine-tree are composed “resemble the fore-teeth;” hence pine-leaves boiled in vinegar were used as a garlic for the relief of toothache. White-coral, from its resemblance to the teeth, was also in requisition, because “it keepeth children to heed their teeth, their gums being rubbed therewith.” For improving the complexion, an ointment made of cowslip-flowers was once recommended, because, as an old writer observes, it “taketh away the spots and wrinkles of the skin, and adds beauty exceedingly.” Mr. Burgess, in his handy little volume on “English Wild Flowers” (1868, 47), referring to the cowslip, says, “the village damsels use it as a cosmetic, and we know it adds to the beauty of the complexion of the town-immured lassie when she searches for and gathers it herself in the early spring morning.” Some of the old herbalists speak of moss gathered from a skull as useful for disorders of the head, and hence it was gathered and preserved.

The rupture-wort (*Herniaria glabra*) was so called from its fancied remedial powers, and the scabious in allusion to the scaly pappus of its seeds, which led to its use in leprous diseases. The well-known fern, spleen-wort (*Asplenium*), had this name applied to it from the lobular form of the leaf, which suggested it as a remedy for diseases of the spleen. Another of its nicknames is miltwaste, because:—

“The finger-ferne, which being given to swine,
It makes their milt to melt away in fine—”

A superstition which seems to have originated in a curious statement made by Vitruvius, that in certain localities in the island of Crete the flocks and herds were found without spleen from their browsing on this plant, whereas in those districts in which it did not grow the reverse was the case. [20]

The yellow bark of the berberry-tree (*Berberis vulgaris*), [21] when taken as a decoction in ale, or white wine, is said to be a purgative, and to have proved highly efficacious in the case of jaundice, hence in some parts of the country it is known as the “jaundice-berry.” Turmeric, too, was formerly prescribed—a plant used for making a yellow dye; [22] and celandine, with its yellow juice, was once equally in repute. Similar remedies we find recommended on the Continent, and in Westphalia an apple mixed with saffron is a popular curative against jaundice. [23] Rhubarb, too, we are told, by the doctrine of signatures, was the “life, soul, heart, and treacle of the liver.” Mr. Folkard [24] mentions a curious superstition which exists in the neighbourhood of Orleans, where a seventh son without a daughter intervening is called a Marcon. It is believed that, “the Marcon's body is marked somewhere with a Fleur-de-Lis, and that if a patient suffering under king's-evil touch this Fleur-de-Lis, or if the Marcon breathe upon him, the malady will be sure to disappear.”

As shaking is one of the chief characteristics of that tedious and obstinate complaint ague, so there was a prevalent notion that the quaking-grass (*Briza media*), when dried and kept in the house, acted as a most powerful deterrent. For the same reason, the aspen, from its constant trembling, has been held a specific for this disease. The lesser celandine (*Ranunculus ficaria*) is known in many country places as the pilewort, because its peculiar tuberous root was long thought to be efficacious as a remedial agent. And Coles, in his “Art of Simpling,” speaks of the purple marsh-wort (*Comarum palustre*) as “an excellent remedy against the purples.” The common tormentil (*Tormentilla officinalis*), from the red colour of its root, was nicknamed the “blood-root,” and was said to be efficacious in dysentery; while the bullock's-lungwort derives its name from the resemblance of its leaf to a dewlap, and was on this account held as a remedy for the pneumonia of bullocks. [25] Such is the curious old folk-lore doctrine of signatures, which in olden times was regarded with so much favour, and for a very long time was recognised, without any questioning, as worthy of men's acceptance. It is one of those popular delusions which scientific research has scattered to the winds, having in its place discovered the true medicinal properties of plants, by the aid of chemical analysis.

Footnotes:

1. Pettigrew's “Medical Superstitions,” 1844, p. 18.
2. Tylor's “Researches into the Early History of Mankind,” 1865, p. 123; Chapiel's “La Doctrine des Signatures,” Paris, 1866.
3. “Flowering Plants of Great Britain,” iv. 109; see Dr. Prior's “Popular Names of British Plants,” 1870-72.
4. Tylor's “Researches into the Early History of Mankind,” p. 123.
5. See Porter Smith's “Chinese Materia Medica,” p. 103; Lockhart, “Medical Missionary in China,” 2nd edition, p. 107; “Reports on Trade at the Treaty Ports of China,” 1868, p. 63.
6. Fiske, “Myths and Mythmakers,” 1873, p. 43.
7. Dr. Prior's “Popular Names of British Plants,” p. 134.
8. See Kelly's “Indo-European Tradition Folk-lore,” 1863, pp. 193-198; Ralston's “Russian Folk-Songs,” 1872, p. 98.
9. “Mystic Trees and Flowers,” Mr. D. Conway, *Frasers Magazine*, Nov. 1870, p. 608.

10. The "receipt," so called, was the formula of magic words to be employed during the process. See Grindon's "Shakspeare Flora," 1883, p. 242.
11. "Popular Antiquities," 1849, i. 315.
12. "Indo-European Tradition and Folk-lore," p. 197.
13. See Dr. Prior's "Popular Names of British Plants," p. 130; Phillips' "Flora Historica," i. 163.
14. See Sowerby's "English Botany," 1864, i., p. 144.
15. See "Folk-lore of British Plants," *Dublin University Magazine*, September 1873, p. 318.
15. See Thorpe's "Northern Mythology," 1852, iii. 168.
17. "Sketches of Imposture, Deception, and Credulity," 1837, p. 300.
18. See Phillips' "Pomarium Britannicum," 1821, p. 351.
19. "Plant-lore of Shakespeare," 1878, p. 101.
20. See Dr. Prior's "Popular Names of British Plants," p. 154.
21. Hogg's "Vegetable Kingdom," p. 34.
22. See Friend's "Flowers and Flower-lore," ii. 355.
23. "Mystic Trees and Flowers," *Fraser's Magazine*, November 1870, p. 591.
24. "Plant Lore Legends and Lyrics," p. 341.
25. *Ibid.*, pp. 150-160.

CHAPTER XVII. PLANTS AND THE CALENDAR.

A goodly array of plants have cast their attractions round the festivals of the year, giving an outward beauty to the ceremonies and observances celebrated in their honour. These vary in different countries, although we frequently find the same flower almost universally adopted to commemorate a particular festival. Many plants, again, have had a superstitious connection, having in this respect exercised a powerful influence among the credulous of all ages, numerous survivals of which exist at the present day. Thus, in Westphalia, it is said that if the sun makes its appearance on New Year's Day, the flax will be straight; and there is a belief current in Hessa, that an apple must not be eaten on New Year's Day, as it will produce an abscess.

According to an old adage, the laurestinus, dedicated to St. Faine (January 1), an Irish abbess in the sixth century, may be seen in bloom:—

"Whether the weather be snow or rain,
We are sure to see the flower of St. Faine;
Rain comes but seldom and often snow,
And yet the viburnum is sure to blow."

And James Montgomery notices this cheerful plant, speaking of it as the,

“Fair tree of winter, fresh and flowering,
When all around is dead and dry,
Whose ruby buds, though storms are lowering,
Spread their white blossoms to the sky.”

Then there is the dead nettle, which in Italy is assigned to St. Vincent; and the Christmas rose (*Helleboris niger*), dedicated to St. Agnes (21st January), is known in Germany as the flower of St. Agnes, and yet this flower has generally been regarded a plant of evil omen, being coupled by Campbell with the hemlock, as growing “by the witches' tower,” where it seems to weave,

“Round its dark vaults a melancholy bower,
For spirits of the dead at night's enchanted hour.”

At Candlemas it was customary, writes Herrick, to replace the Christmas evergreens with sprigs of box, which were kept up till Easter Eve:—

“Down with the rosemary and bays,
Down with the mistletoe,
Instead of holly now upraise
The greener box for show.”

The snowdrop has been nicknamed the “Fair Maid of February,” from its blossoming about this period, when it was customary for young women dressed in white to walk in procession at the Feast of the Purification, and, according to the old adage:—

“The snowdrop in purest white array,
First rears her head on Candlemas Day.”

The dainty crocus is said to blow “before the shrine at vernal dawn of St. Valentine.” And we may note here how county traditions affirm that in some mysterious way the vegetable world is affected by leap-year influences. A piece of agricultural folk-lore current throughout the country tells us how all the peas and beans grow the wrong way in their pods, the seeds being set in quite the contrary to what they are in other years. The reason assigned for this strange freak of nature is that, “it is the ladies' year, and they (the peas and beans) always lay the wrong way in leap year.”

The leek is associated with St. David's Day, the adoption of this plant as the national device of Wales having been explained in various ways. According to Shakespeare it dates from the battle of Cressy, while some have maintained it originated in a victory obtained by Cadwallo over the Saxons, 640, when the Welsh, to distinguish themselves, wore leeks in their hats. It has also been suggested that Welshmen “beautify their hats with verdant leek,” from the custom of every farmer, in years gone by, contributing his leek to the common repast when they met at the Cymortha or Association, and mutually helped one another in ploughing their land.

In Ireland the shamrock is worn on St. Patrick's Day. Old women, with plenteous supplies of trefoil, may be heard in every direction crying, “Buy my shamrock, green shamrocks,” while little children have “Patrick's crosses” pinned to their sleeves, a custom which is said to have originated in the circumstance that when St. Patrick was preaching the doctrine of the Trinity he made use of the trefoil as a symbol of the great mystery.

Several plants have been identified as the shamrock; and in “Contributions towards a Cybele Hibernica,”^[1] is the following extensive note:—“*Trifolium repens*, Dutch clover, shamrock.—This is the plant still worn as shamrock on St. Patrick's Day, though *Medicago lupulina* is also sold in Dublin as the shamrock. Edward Lhwyd, the celebrated antiquary, writing in 1699 to Tancred Robinson, says, after a recent visit to Ireland: 'Their shamrug is our common clover' (*Phil. Trans.*, No. 335). Threkeld, the earliest writer on the wild plants of Ireland, gives *Seamar-oge* (young trefoil) as the Gaelic name for *Trifolium pratense album*, and expressly says this is the plant worn by the people in their hats on St. Patrick's Day.” Some, again, have advocated the claims of the wood-sorrel, and others those of the speedwell, whereas a correspondent of *Notes and Queries* (4th Ser. iii. 235) says the *Trifolium filiforme* is generally worn in Cork, the *Trifolium minus* also being in demand. It has

been urged that the watercress was the plant gathered by the saint, but this plant has been objected to on the ground that its leaf is not trifoliate, and could not have been used by St. Patrick to illustrate the doctrine of the Trinity. On the other hand, it has been argued that the story is of modern date, and not to be found in any of the lives of that saint. St. Patrick's cabbage also is a name for "London Pride," from its growing in the West of Ireland, where the Saint lived.

Few flowers have been more popular than the daffodil or lent-lily, or, as it is sometimes called, the lent-rose. There are various corruptions of this name to be found in the West of England, such as lentils, lent-a-lily, lents, and lent-cocks; the last name doubtless referring to the custom of cock-throwing, which was allowed in Lent, boys, in the absence of live cocks, having thrown sticks at the flower. According also to the old rhyme:—

"Then comes the daffodil beside
Our Lady's smock at our Lady's tide."

In Catholic countries Lent cakes were flavoured with the herb-tansy, a plant dedicated to St. Athanasius.

In Silesia, on Mid-Lent Sunday, pine boughs, bound with variegated paper and spangles, are carried about by children singing songs, and are hung over the stable doors to keep the animals from evil influences.

Palm Sunday receives its English and the greater part of its foreign names from the old practice of bearing palm-branches, in place of which the early catkins of the willow or yew have been substituted, sprigs of box being used in Brittany.

Stow, in his "Survey of London," tells us that:—"In the weeke before Easter had ye great shows made for the fetching in of a twisted tree or with, as they termed it, out of the wodes into the king's house, and the like into every man's house of honour of worship." This anniversary has also been nicknamed "Fig Sunday," from the old custom of eating figs; while in Wales it is popularly known as "Flowering Sunday," because persons assemble in the churchyard and spread fresh flowers upon the graves of their friends and relatives.

In Germany, on Palm Sunday, the palm is credited with mystic virtues; and if as many twigs, as there are women of a family, be thrown on a fire—each with a name inscribed on it—the person whose leaf burns soonest will be the first to die.

On Good Friday, in the North of England, an herb pudding was formerly eaten, in which the leaves of the passion-dock (*Polygonum bistorta*) formed the principal ingredient. In Lancashire fig-sue is made, a mixture consisting of sliced figs, nutmeg, ale, and bread.

Wreaths of elder are hung up in Germany after sunset on Good Friday, as charms against lightning; and in Swabia a twig of hazel cut on this day enables the possessor to strike an absent person. In the Tyrol, too, the hazel must be cut on Good Friday to be effectual as a divining-rod. A Bohemian charm against fleas is curious. During Holy Week a leaf of palm must be placed behind a picture of the Virgin, and on Easter morning taken down with this formula: "Depart, all animals without bones." If this rite is observed there will be no more fleas in the house for the remainder of the year.

Of the flowers associated with Eastertide may be mentioned the garden daffodil and the purple pasque flower, another name for the anemone (*Anemone pulsatilla*), in allusion to the Passover and Paschal ceremonies. White broom is also in request, and indeed all white flowers are dedicated to this festival. On Easter Day the Bavarian peasants make garlands of coltsfoot and throw them into the fire; and in the district of Lechrain every household brings to the sacred fire which is lighted at Easter a walnut branch, which, when partially burned, is laid on the hearth-fire during tempests as a charm against lightning. In Slavonian regions the palm is supposed to specially protect the locality where it grows from inclement weather and its hurtful effects; while, in Pomerania, the apple is eaten against fevers.

In Bareuth young girls go at midnight on Easter Day to a fountain silently, and taking care to escape notice, throw into the water little willow rings with their friends' names inscribed thereon, the person whose ring sinks

the quickest being the first to die.

In years past the milkwort (*Polygala vulgaris*), from being carried in procession during Rogation Week, was known by such names as the rogation-flower, gang-flower, procession-flower, and cross-flower, a custom noticed by Gerarde, who tells us how, “the maidens which use in the countries to walke the procession do make themselves garlands and noseгаies of the milkwort.”

On Ascension Day the Swiss make wreaths of the edelweisse, hanging them over their doors and windows; another plant selected for this purpose being the amaranth, which, like the former, is considered an emblem of immortality.

In our own country may be mentioned the well-dressing of Tissington, near Dovedale, in Derbyshire, the wells in the village having for years past been most artistically decorated with the choicest flowers. ^[2]

Formerly, on St. George's Day (April 23), blue coats were worn by people of fashion. Hence, the harebell being in bloom, was assigned to the saint:—

“On St. George's Day, when blue is worn,
The blue harebells the fields adorn.”

Flowers have always entered largely into the May Day festival; and many a graphic account has been bequeathed us of the enthusiasm with which both old and young went “a-Maying” soon after midnight, breaking down branches from the trees, which, decorated with nosegays and garlands of flowers, were brought home soon after sunrise and placed at the doors and windows. Shakespeare (“Henry VIII.,” v. 4), alluding to the custom, says:—

“Tis as much impossible,
Unless we sweep them from the doors with cannons,
To scatter 'em, as 'tis to make 'em sleep
On May Day morning.”

Accordingly, flowers were much in demand, many being named from the month itself, as the hawthorn, known in many places as May-bloom and May-tree, whereas the lily of the valley is nicknamed May-lily. Again, in Cornwall lilac is termed May-flower, and the narrow-leaved elm, which is worn by the peasant in his hat or button-hole, is called May. Similarly, in Germany, we find the term May-bloom applied to such plants as the king-cup and lily of the valley. In North America, says the author of “Flower-lore,” the podophyllum is called “May-apple,” and the fruit of the *Passiflora incarnata* “May-hops.” The chief uses of these May-flowers were for the garlands, the decoration of the Maypole, and the adornment of the home:—

“To get sweet setywall (red valerian),
The honeysuckle, the harlock,
The lily, and the lady-smock,
To deck their summer hall.”

But one plant was carefully avoided—the cuckoo flower.^[3] As in other floral rites, the selection of plants varies on the Continent, branches of the elder being carried about in Savoy, and in Austrian Silesia the Maypole is generally made of fir. According to an Italian proverb, the universal lover is “one who hangs every door with May.”

Various plants are associated with Whitsuntide, and according to Chaucer, in his “Romaunt of the Rose”:—

“Have hatte of floures fresh as May,
Chapelett of roses of Whitsunday,
For sich array be costeth but lite.”

In Italy the festival is designated “Pasqua Rosata,” from falling at a time when roses are in bloom, while in Germany the peony is the Pentecost rose.

Herrick tells us it was formerly the practice to use birch and spring-flowers for decorative purposes at Whitsuntide:—

“When yew is out then birch comes in,
And May-flowers beside,
Both of a fresh and fragrant kinne,
To honour Whitsontide.”

At this season, too, box-boughs were gathered to deck the large open fire-places then in fashion, and the guelder rose was dedicated to the festival. Certain flower-sermons have been preached in the city at Whitsuntide, as, for instance, that at St. James's Church, Mitre Court, Aldgate, and another at St. Leonard's Church, Shoreditch, known as the Fairchild Lecture. Turning to the Continent, it is customary in Hanover on Whit-Monday to gather the lily of the valley, and at the close of the day there is scarcely a house without a large bouquet, while in Germany the broom is a favourite plant for decorations. In Russia, at the completion of Whitsuntide, young girls repair to the banks of the Neva and cast in wreaths of flowers in token of their absent friends.

Certain flowers, such as the rose, lavender, woodruff, and box were formerly in request for decking churches on St. Barnabas' Day, the officiating clergy having worn wreaths of roses. Among the allusions to the usage may be mentioned the following entries in the churchwarden's accounts of St. Mary-at-Hill, London, in the reigns of Edward IV. and Henry VII.:—“For rose garlondis and woodrolf garlondis on St. Barnabe Daye, xj'd.” “Item, for two doss (dozen?) di bocse (box) garlands for prestes and clerkes on St. Barnabe Day, j's. v'd.”

St. Barnabas' thistle (*Centaurea solstitialis*) derived its name from flowering at the time of the saint's festival, and we are told how:—

“When St. Barnaby bright smiles night and day,
Poor ragged robin blooms in the hay.”

To Trinity Sunday belong the pansy, or herb-trinity and trefoil, hence the latter has been used for decorations on this anniversary.

In commemoration of the Restoration of Charles II., oak leaves and gilded oak apples have been worn; oak branches having been in past years placed over doors and windows.

Stowe, in his “Survey of London,” speaks of the old custom of hanging up St. John's wort over the doors of houses, along with green birch or pine, white lilies, and other plants. The same practice has existed very largely on the Continent, St. John's wort being still regarded as an effective charm against witchcraft. Indeed, few plants have been in greater request on any anniversary, or been invested with such mystic virtues. Fennel, another of the many plants dedicated to St. John, was hung over doors and windows on his night in England, numerous allusions to which occur in the literature of the past. And in connection with this saint we are told how:—

“The scarlet lychnis, the garden's pride,
Flames at St. John the Baptist's tyde.”

Hemp was also in demand, many forms of divination having been practised by means of its seed.

According to a belief in Iceland, the trijacent (*Spiraea ulmaria*) will, if put under water on this day, reveal a thief; floating if the thief be a woman, and sinking if a man.

In the Harz, on Midsummer night, branches of the fir-tree are decorated with flowers and coloured eggs, around which the young people dance, singing rhymes. The Bolognese, who regard garlic as the symbol of abundance, buy it at the festival as a charm against poverty during the coming year. The Bohemian, says Mr. Conway,

“thinks he can make himself shot-proof for twenty-four hours by finding on St. John's Day pine-cones on the top of a tree, taking them home, and eating a single kernel on each day that he wishes to be invulnerable.” In Sicily it is customary, on Midsummer Eve, to fell the highest poplar, and with shouts to drag it through the village, while some beat a drum. Around this poplar, says Mr. Folkard,^[4] “symbolising the greatest solar ascension and the decline which follows it, the crowd dance, and sing an appropriate refrain;” and he further mentions that, at the commencement of the Franco-German War, he saw sprigs of pine stuck on the railway carriages bearing the German soldiers into France.

In East Prussia, the sap of dog-wood, absorbed in a handkerchief, will fulfil every wish; and a Brandenburg remedy for fever is to lie naked under a cherry-tree on St. John's Day, and to shake the dew on one's back. Elsewhere we have alluded to the flowering of the fern on this anniversary, and there is the Bohemian idea that its seed shines like glittering gold.

Corpus Christi Day was, in olden times, observed with much ceremony, the churches being decorated with roses and other choice garlands, while the streets through which the procession passed were strewn with flowers. In North Wales, flowers were scattered before the door; and a particular fern, termed Rhedyn Mair, or Mary's fern—probably the maiden-hair—was specially used for the purpose.

We may mention here that the daisy (*Bellis perennis*) was formerly known as herb-Margaret or Marguerite, and was erroneously supposed to have been named after the virtuous St. Margaret of Antioch:—

“Maid Margarete, that was so meek and mild;”

Whereas it, in all probability, derives its name from St. Margaret of Cortona. According to an old legend it is stated:—

“There is a double flouret, white and red,
That our lasses call herb-Margaret,
In honour of Cortona's penitent,
Whose contrite soul with red remorse was rent;
While on her penitence kind heaven did throw
The white of purity, surpassing snow;
So white and red in this fair flower entwine,
Which maids are wont to scatter at her shrine.”

Again, of the rainy saint, St. Swithin, we are reminded that:—

“Against St. Swithin's hastie showers,
The lily white reigns queen of the flowers”—

A festival around which so much curious lore has clustered.

In former years St. Margaret's Day (July 20) was celebrated with many curious ceremonies, and, according to a well-known couplet in allusion to the emblem of the vanquished dragon, which appears in most pictures of St. Margaret:—

“Poppies a sanguine mantle spread
For the blood of the dragon that Margaret shed.”

Archdeacon Hare says the Sweet-William, designated the “painted lady,” was dedicated to Saint William (June 25), the term “sweet” being a substitution for “saint.” This seems doubtful, and some would corrupt the word “sweet” from the French *oeillet*, corrupted to Willy, and thence to William. Mr. King, however, considers that the small red pink (*Dianthus prolifer*), found wild in the neighbourhood of Rochester, “is perhaps the original Saint Sweet-William,” for, he adds, the word “saint” has only been dropped since days which saw the demolition of St. William's shrine in the cathedral. This is but a conjecture, it being uncertain whether the masses of bright

flowers which form one of the chief attractions of old-fashioned gardens commemorate St. William of Rochester, St. William of York, or, likeliest perhaps of the three, St. William of Aquitaine, the half soldier, half monk, whose fame was so widely spread throughout the south of Europe.

Roses were said to fade on St. Mary Magdalene's Day (July 20), to whom we find numerous flowers dedicated, such as the maudlin, a nickname of the costmary, either in allusion to her love of scented ointment, or to its use in uterine affections, over which she presided as the patroness of unchaste women, and maudlin-wort, another name for the moon-daisy. But, as Dr. Prior remarks, it should, "be observed that the monks in the Middle Ages mixed up with the story of the Magdalene that of another St. Mary, whose early life was passed in a course of debauchery."

A German piece of folk-lore tells us that it is dangerous to climb a cherry-tree on St. James's Night, as the chance of breaking one's neck will be great, this day being held unlucky. On this day is kept St. Christopher's anniversary, after whom the herb-christopher is named, a species of aconite, according to Gerarde. But, as Dr. Prior adds, the name is applied to many plants which have no qualities in common, some of these being the meadow-sweet, fleabane, osmund-fern, herb-impious, everlasting-flower, and baneberry.

Throughout August, during the ingathering of the harvest, a host of customs have been kept up from time immemorial, which have been duly noticed by Brand, while towards the close of the month we are reminded of St. Bartholomew's Day by the gaudy sunflower, which has been nicknamed St. Bartholomew's star, the term "star" having been often used "as an emblematical representation of brilliant virtues or any sign of admiration." It is, too, suggested by Archdeacon Hare that the filbert may owe its name to St. Philbert, whose festival was on the 22nd August.

The passion-flower has been termed Holy Rood flower, and it is the ecclesiastical emblem of Holy Cross Day, for, according to the familiar couplet:—

"The passion-flower long has blow'd
To betoken us signs of the Holy Rood."

Then there is the Michaelmas Day, which:—

"Among dead weeds,
Bloom for St. Michael's valorous deeds,"

and the golden star lily, termed St. Jerome's lily. On St. Luke's Day, certain flowers, as we have already noticed, have been in request for love divinations; and on the Continent the chestnut is eaten on the festival of St. Simon, in Piedmont on All Souls' Day, and in France on St. Martin's, when old women assemble beneath the windows and sing a long ballad. Hallowe'en has its use among divinations, at which time various plants are in request, and among the observance of All Souls' Day was blessing the beans. It would appear, too, that in days gone by, on the eve of All Saints' Day, heath was specially burnt by way of a bonfire:—

"On All Saints' Day bare is the place where the heath is burnt;
The plough is in the furrow, the ox at work."

From the shape of its flower, the trumpet-flowered wood-sorrel has been called St. Cecilia's flower, whose festival is kept on November 22. The *Nigella damascena*, popularly known as love-in-a-mist, was designated St. Catherine's flower, "from its persistent styles," writes Dr. Prior,^[5] "resembling the spokes of her wheel." There was also the Catherine-pear, to which Gay alludes in his "Pastorals," where Sparabella, on comparing herself with her rival, says:—

"Her wan complexion's like the withered leek,
While Catherine-pears adorn my ruddy cheek."

Herb-Barbara, or St. Barbara's cress (*Barbarea vulgaris*), was so called from growing and being eaten about the time of her festival (December 4).

Coming to Christmas, some of the principal evergreens used in this country for decorative purposes are the ivy, laurel, bay, arbor vitae, rosemary, and holly; mistletoe, on account of its connection with Druidic rites, having been excluded from churches. Speaking of the holly, Mr. Conway remarks that, "it was to the ancient races of the north a sign of the life which preserved nature through the desolation of winter, and was gathered into pagan temples to comfort the sylvan spirits during the general death." He further adds that "it is a singular fact that it is used by the wildest Indians of the Pacific coast in their ceremonies of purification. The ashen-faggot was in request for the Christmas fire, the ceremonies relating to which are well known."

Footnotes:

1. By D. Moore and A.G. Moore, 1866.
2. See "Journal of the Arch. Assoc.," 1832, vii. 206.
3. See "British Popular Customs."
4. "Plant Lore Legends and Lyrics," p. 504.
5. "Popular Names of British Plants," 1879, p. 204.

CHAPTER XVIII. CHILDREN'S RHYMES AND GAMES.

Children are more or less observers of nature, and frequently far more so than their elders. This, perhaps, is in a great measure to be accounted for from the fact that childhood is naturally inquisitive, and fond of having explained whatever seems in any way mysterious. Such especially is the case in the works of nature, and in a country ramble with children their little voices are generally busy inquiring why this bird does this, or that plant grows in such a way—a variety of questions, indeed, which unmistakably prove that the young mind instinctively seeks after knowledge. Hence, we find that the works of nature enter largely into children's pastimes; a few specimens of their rhymes and games associated with plants we quote below.

In Lincolnshire, the butter-bur (*Petasites vulgaris*) is nicknamed bog-horns, because the children use the hollow stalks as horns or trumpets, and the young leaves and shoots of the common hawthorn (*Cratoegus oxyacantha*), from being commonly eaten by children in spring, are known as "bread and cheese;" while the ladies-smock (*Cardamine pratensis*) is termed "bread and milk," from the custom, it has been suggested, of country people having bread and milk for breakfast about the season when the flower first comes in. In the North of England this plant is known as cuckoo-spit, because almost every flower stem has deposited upon it a frothy patch not unlike human saliva, in which is enveloped a pale green insect. Few north-country children will gather these flowers, believing that it is unlucky to do so, adding that the cuckoo has spit upon it when flying over. ^[1]

The fruits of the mallow are popularly termed by children cheeses, in allusion to which Clare writes:—

"The sitting down when school was o'er,
Upon the threshold of the door,
Picking from mallows, sport to please,
The crumpled seed we call a cheese."

A Buckinghamshire name with children for the deadly nightshade (*Atropa belladonna*) is the naughty-man's cherry, an illustration of which we may quote from Curtis's "Flora Londinensis":—"On Keep Hill, near High Wycombe, where we observed it, there chanced to be a little boy. I asked him if he knew the plant. He answered 'Yes; it was naughty-man's cherries.'" In the North of England the broad-dock (*Rumex obtusifolius*), when in seed, is known by children as curly-cows, who milk it by drawing the stalks through their fingers. Again, in the same locality, children speaking of the dead-man's thumb, one of the popular names of the *Orchis mascula*, tell

one another with mysterious awe that the root was once the thumb of some unburied murderer. In one of the “Roxburghe Ballads” the phrase is referred to:—

“Then round the meadows did she walke,
Catching each flower by the stalke,
Suche as within the meadows grew,
As dead-man's thumbs and harebell blue.”

It is to this plant that Shakespeare doubtless alludes in “Hamlet” (Act iv. sc. 7), where:—

“Long purples
That liberal shepherds give a grosser name,
But our cold maids do dead-men's fingers call them.”

In the south of Scotland, the name “doudle,” says Jamieson, is applied to the root of the common reed-grass (*Phragmites communis*), which is found, partially decayed, in morasses, and of “which the children in the south of Scotland make a sort of musical instrument, similar to the oaten pipes of the ancients.” In Yorkshire, the water-scrophularia (*Scrophularia aquatica*), is in children's language known as “fiddle-wood,” so called because the stems are by children stripped of their leaves, and scraped across each other fiddler-fashion, when they produce a squeaking sound. This juvenile music is the source of infinite amusement among children, and is carried on by them with much enthusiasm in their games. Likewise, the spear-thistle (*Carduus lanceolatus*) is designated Marian in Scotland, while children blow the pappus from the receptacle, saying:—

“Marian, Marian, what's the time of day,
One o'clock, two o'clock—it's time we were away.”

In Cheshire, when children first see the heads of the ribwort plantain (*Plantago lanceolata*) in spring, they repeat the following rhyme:—

“Chimney sweeper all in black,
Go to the brook and wash your back,
Wash it clean, or wash it none;
Chimney sweeper, have you done?”:—

Being in all probability a mode of divination for insuring good luck. Another name for the same plant is “cocks,” from children fighting the flower-stems one against another.

The common hazel-nut (*Corylus avellana*) is frequently nicknamed the “cob-nut,” and was so called from being used in an old game played by children. An old name for the devil's-bit (*Scabiosa succisa*), in the northern counties, and in Scotland, is “curl-doddy,” from the resemblance of the head of flowers to the curly pate of a boy, this nickname being often used by children who thus address the plant:—

“Curly-doddy, do my biddin',
Soop my house, and shoal my widden'.”

In Ireland, children twist the stalk, and as it slowly untwists in the hand, thus address it:—

“Curl-doddy on the midden,
Turn round an' take my biddin'.”

In Cumberland, the *Primula farinosa*, commonly known as bird's-eye, is called by children “bird-eeen.”

“The lockety-gowan and bonny bird-eeen
Are the fairest flowers that ever were seen.”

And in many places the *Leontodon taraxacum* is designated “blow-ball,” because children blow the ripe fruit from the receptacle to tell the time of day and for various purposes of divination. Thus in the “Sad Shepherd,” page 8, it is said:—

“Her treading would not bend a blade of grass,
Or shake the downy blow-ball from his stalk.”

In Scotland, one of the popular names of the *Angelica sylvestris* is “aik-skeeters,” or “hear-skeeters,” because children shoot oats through the hollow stems, as peas are shot through a pea-shooter. Then there is the goose-grass (*Galium aparine*), variously called goose-bill, beggar's-lice, scratch-weed, and which has been designated blind-tongue, because “children with the leaves practise phlebotomy upon the tongue of those playmates who are simple enough to endure it,” a custom once very general in Scotland. [2]

The catkins of the willow are in some counties known as “goslings,” or “goslins,”—children, says Halliwell, [3] sometimes playing with them by putting them in the fire and singeing them brown, repeating verses at the same time. One of the names of the heath-pea (*Lathyrus macrorrhizus*) is liquory-knots, and school-boys in Berwickshire so call them, for when dried their taste is not unlike that of the real liquorice. [4] Again, a children's name of common henbane (*Hyoscyamus niger*) is “loaves of bread,” an allusion to which is made by Clare in his “Shepherd's Calendar”:—

“Hunting from the stack-yard sod
The stinking henbane's belted pod,
By youth's warm fancies sweetly led
To christen them his loaves of bread.”

A Worcestershire name for a horse-chestnut is the “oblionker tree.” According to a correspondent of *Notes and Queries* (5th Ser. x. 177), in the autumn, when the chestnuts are falling from their trunks, boys thread them on string and play a “cob-nut” game with them. When the striker is taking aim, and preparing for a shot at his adversary's nut, he says:—

“Oblionker!
My first conker (conquer).”

The word oblionker apparently being a meaningless invention to rhyme with the word conquer, which has by degrees become applied to the fruit itself.

The wall peniterry (*Parietaria officinalis*) is known in Ireland as “peniterry,” and is thus described in “Father Connell, by the O'Hara Family” (chap, xii.):—

“A weed called, locally at least, peniterry, to which the suddenly terrified [schoolboy] idler might run in his need, grasping it hard and threateningly, and repeating the following 'words of power':—

'Peniterry, peniterry, that grows by the wall,
Save me from a whipping, or I'll pull you roots and all.'“

Johnston, who has noticed so many odd superstitions, tells us that the tuberous ground-nut (*Bunium flexuosum*), which has various nicknames, such as “lousy,” “loozie,” or “lucie arnut,” is dug up by children who eat the roots, “but they are hindered from indulging to excess by a cherished belief that the luxury tends to generate vermin in the head.” [5]

An old rhyme often in years past used by country children when the daffodils made their annual appearance in early spring, was as follows:—

“Daff-a-down-dill
Has now come to town,
In a yellow petticoat
And a green gown.”

A name for the shepherd's purse is “mother's-heart,” and in the eastern Border district, says Johnston, children have a sort of game with the seed-pouch. They hold it out to their companions, inviting them to “take a haud o' that.” It immediately cracks, and then follows a triumphant shout, “You've broken your mother's heart.” In Northamptonshire, children pick the leaves of the herb called pick-folly, one by one, repeating each time the words, “Rich man, poor man, beggar-man, thief,” &c., fancying that the one which comes to be named at the last plucking will prove the conditions of their future partners. Variations of this custom exist elsewhere, and a correspondent of “Science Gossip” (1876, xi. 94). writes:—“I remember when at school at Birmingham that my playmates manifested a very great repugnance to this plant. Very few of them would touch it, and it was known to us by the two bad names, “haughty-man's plaything,” and “pick your mother's heart out.” In Hanover, as well as in the Swiss canton of St. Gall, the same plant is offered to uninitiated persons with a request to pluck one of the pods. Should he do so the others exclaim, “You have stolen a purse of gold from your father and mother.”” “It is interesting to find,” writes Mr. Britten in the “Folk-lore Record” (i. 159), “that a common tropical weed, *Ageratum conyzoides*, is employed by children in Venezuela in a very similar manner.”

The compilers of the “Dictionary of Plant Names” consider that the double (garden) form of *Saxifraga granulata*, designated “pretty maids,” may be referred to in the old nursery rhyme:—

“Mary, Mary, quite contrary,
How does your garden grow?
Cockle-shells, and silver bells,
And pretty maids all in a row.”

The old-man's-beard (*Clematis vitalba*) is in many places popularly known as smoke-wood, because “our village-boys smoke pieces of the wood as they do of rattan cane; hence, it is sometimes called smoke-wood, and smoking-cane.” [6]

The children of Galloway play at hide-and-seek with a little black-topped flower which is known by them as the Davie-drap, meantime repeating the following rhyme:—

“Within the bounds of this I hap
My black and bonnie Davie-drap:
Wha is he, the cunning ane,
To me my Davie-drap will fin'?”

This plant, it has been suggested, [7] being the cuckoo grass (*Luzula campestris*), which so often figures in children's games and rhymes.

Once more, there are numerous games played by children in which certain flowers are introduced, as in the following, known as “the three flowers,” played in Scotland, and thus described in Chambers's “Popular Rhymes,” p. 127:—“A group of lads and lasses being assembled round the fire, two leave the party and consult together as to the names of three others, young men or girls, whom they designate as the red rose, the pink, and the gillyflower. The two young men then return, and having selected a member of the fairer group, they say to her:—

'My mistress sent me unto thine,
Wi' three young flowers baith fair and fine:—
The pink, the rose, and the gillyflower,
And as they here do stand,

Whilk will ye sink, whilk will ye swim,
And whilk bring hame to land?'

The maiden must choose one of the flowers named, on which she passes some approving epithet, adding, at the same time, a disapproving rejection of the other two, as in the following terms: 'I will sink the pink, swim the rose, and bring hame the gillyflower to land.' The young men then disclose the names of the parties upon whom they had fixed those appellations respectively, when it may chance she has slighted the person to whom she is most attached, and contrariwise." Games of this kind are very varied, and still afford many an evening's amusement among the young people of our country villages during the winter evenings.

Footnotes:

1. *Journal of Horticulture*, 1876, p. 355.
2. Johnston's "Botany of Eastern Borders."
3. "Dictionary of Archaic and Provincial Words."
4. Johnston's "Botany of Eastern Borders," p. 57.
5. "Botany of Eastern Borders," p. 85.
6. "English Botany," ed. I, iii. p. 3.
7. "Dictionary of Plant Names" (Britten and Holland), p. 145.

CHAPTER XIX. SACRED PLANTS.

Closely allied with plant-worship is the sacred and superstitious reverence which, from time immemorial, has been paid by various communities to certain trees and plants.

In many cases this sanctity originated in the olden heathen mythology, when "every flower was the emblem of a god; every tree the abode of a nymph." From their association, too, with certain events, plants frequently acquired a sacred character, and occasionally their specific virtues enhanced their veneration. In short, the large number of sacred plants found in different countries must be attributed to a variety of causes, illustrations of which are given in the present chapter.

Thus going back to mythological times, it may be noticed that trees into which persons were metamorphosed became sacred. The laurel was sacred to Apollo in memory of Daphne, into which tree she was changed when escaping from his advances:—

"Because thou canst not be
My mistress, I espouse thee for my tree;
Be thou the prize of honour and renown,
The deathless poet and the poet's crown;
Thou shalt the Roman festivals adorn,
And, after poets, be by victors won."

But it is unnecessary to give further instances of such familiar stories, of which early history is full. At the same time it is noteworthy that many of these plants which acquired a sanctity from heathen mythology still retain their sacred character—a fact which has invested them with various superstitions, in addition to having caused them to be selected for ceremonial usage and homage in modern times. Thus the pine, with its mythical origin and heathen associations, is an important tree on the Continent, being surrounded with a host of legends, most of which, in one shape or another, are relics of early forms of belief. The sacred character of the oak still survives in modern folk-lore, and a host of flowers which grace our fields and hedges have sacred associations from their

connection with the heathen gods of old. Thus the anemone, poppy, and violet were dedicated to Venus; and to Diana “all flowers growing in untrodden dells and shady nooks, uncontaminated by the tread of man, more especially belonged.” The narcissus and maidenhair were sacred to Proserpina, and the willow to Ceres. The pink is Jove's flower, and of the flowers assigned to Juno may be mentioned the lily, crocus, and asphodel.

Passing on to other countries, we find among the plants most conspicuous for their sacred character the well-known lotus of the East (*Nelunibium speciosum*), around which so many traditions and mythological legends have clustered. According to a Hindu legend, from its blossom Brahma came forth:—

“A form Cerulean fluttered o'er the deep;
Brightest of beings, greatest of the great,
Who, not as mortals steep
Their eyes in dewy sleep,
But heavenly pensive on the lotus lay,
That blossom'd at his touch, and shed a golden ray.
Hail, primal blossom! hail, empyreal gem,
Kemel, or Pedma, ^[1] or whate'er high name
Delight thee, say. What four-formed godhead came,
With graceful stole and beamy diadem,
Forth from thy verdant stem.” ^[2]

Buddha, too, whose symbol is the lotus, is said to have first appeared floating on this mystic flower, and, indeed, it would seem that many of the Eastern deities were fond of resting on its leaves; while in China, the god Pazza is generally represented as occupying this position. Hence the lotus has long been an object of worship, and as a sacred plant holds a most distinguished place, for it is the flower of the,

“Old Hindu mythologies, wherein
The lotus, attribute of Ganga—embling
The world's great reproductive power—was held
In veneration.”

We may mention here that the lotus, known also as the sacred bean of Egypt, and the rose-lily of the Nile, as far back as four thousand years ago was held in high sanctity by the Egyptian priests, still retaining its sacred character in China, Japan, and Asiatic Russia.

Another famous sacred plant is the soma or moon-plant of India, the *Asclepias acida*, a climbing plant with milky juice, which Windischmann has identified with the “tree of life which grew in paradise.” Its milk juice was said to confer immortality, the plant itself never decaying; and in a hymn in the *Rig Veda* the soma sacrifice is thus described:—

“We've quaffed the soma bright
And are immortal grown,
We've entered into light
And all the gods have known.
What mortal can now harm,
Or foeman vex us more?
Through thee beyond alarm,
Immortal God! we soar.”

Then there is the peepul or bo-tree (*Ficus religiosa*), which is held in high veneration by the followers of Buddha, in the vicinity of whose temples it is generally planted. One of these trees in Ceylon is said to be of very great antiquity, and according to Sir J. E. Tennant, “to it kings have even dedicated their dominions in testimony of their belief that it is a branch of the identical fig-tree under which Gotama Buddha reclined when he underwent his apotheosis.”

The peepul-tree is highly venerated in Java, and by the Buddhists of Thibet is known as the bridge of safety, over which mortals pass from the shores of this world to those of the unseen one beyond. Occasionally confounded with this peepul is the banyan (*Ficus indica*), which is another sacred tree of the Indians. Under its shade Vishnu is said to have been born; and by the Chinese, Buddha is represented as sitting beneath its leaves to receive the homage of the god Brahma. Another sacred tree is the deodar (*Cedrus deodara*), a species of cedar, being the Devadara, or tree-god of the Shastras, which in so many of the ancient Hindu hymns is depicted as the symbol of power and majesty. [3] The aroka, or *Saraca indica*, is said to preserve chastity, and is dedicated to Kama, the Indian god of love, while with the negroes of Senegambia the baobab-tree is an object of worship. In Borneo the nipa-palm is held in veneration, and the Mexican Indians have their moriche-palm (*Mauritia flexuosa*). The *Tamarindus Indica* is in Ceylon dedicated to Siva, the god of destruction; and in Thibet, the jambu or rose-apple is believed to be the representative of the divine amarita-tree which bears ambrosia.

The pomegranate, with its mystic origin and early sacred associations, was long revered by the Persians and Jews, an old tradition having identified it as the forbidden fruit given by Eve to Adam. Again, as a sacred plant the basil has from time immemorial been held in high repute by the Hindus, having been sacred to Vishnu. Indeed it is worshipped as a deity itself, and is invoked as the goddess Tulasi for the protection of the human frame. It is further said that “the heart of Vishnu, the husband of the Tulasi, is agitated and tormented whenever the least sprig is broken of a plant of Tulasi, his wife.”

Among further flowers holding a sacred character may be mentioned the henna, the Egyptian privet (*Lawsonia alba*), the flower of paradise, which was pronounced by Mahomet as “chief of the flowers of this world and the next,” the wormwood having been dedicated to the goddess Iris. By the aborigines of the Canary Islands, the dragon-tree (*Dracoena draco*) of Orotava was an object of sacred reverence; [4] and in Burmah at the present day the eugenia is held sacred. [5]

It has been remarked that the life of Christ may be said to fling its shadow over the whole vegetable world. [6] “From this time the trees and the flowers which had been associated with heathen rites and deities, began to be connected with holier names, and not unfrequently with the events of the crucifixion itself.”

Thus, upon the Virgin Mary a wealth of flowers was lavished, all white ones, having been “considered typical of her purity and holiness, and consecrated to her festivals.” [7] Indeed, not only, “were the finer flowers wrested from the classic Juno and Diana, and from the Freyja and Bertha of northern lands given to her, but lovely buds of every hue were laid upon her shrines.” [8] One species, for instance, of the maiden-hair fern, known also as “Our Lady's hair,” is designated in Iceland “Freyja's hair,” and the rose, often styled “Frau rose,” or “Mother rose,” the favourite flower of Hulda, was transferred to the Virgin. On the other hand, many plants bearing the name of Our Lady, were, writes Mr. Folkard, in Puritan times, “replaced by the name of Venus, thus recurring to the ancient nomenclature; 'Our Lady's comb' becoming 'Venus's comb.'” But the two flowers which were specially connected with the Virgin were the lily and the rose. Accordingly, in Italian art, a vase of lilies stands by the Virgin's side, with three flowers crowning three green stems. The flower is generally the large white lily of our gardens, “the pure white petals signifying her spotless body, and the golden anthers within typifying her soul sparkling with divine light.” [9]

The rose, both red and white, appears at an early period as an emblem of the Virgin, “and was specially so recognised by St. Dominic when he instituted the devotion of the rosary, with direct reference to her.” [10] Among other flowers connected with the Virgin Mary may be mentioned the flowering-rod, according to which Joseph was chosen for her husband, because his rod budded into flower, and a dove settled upon the top of it. In Tuscany a similar legend is attached to the oleander, and elsewhere the white campanula has been known as the “little staff of St. Joseph,” while a German name for the white double daffodill is “Joseph's staff.”

Then there is “Our Lady's bed-straw,” which filled the manger on which the infant Jesus was laid; while of the plant said to have formed the Virgin's bed may be mentioned the thyme, woodroof, and groundsel. The white-spotted green leaves of “Our Lady's thistle” were caused by some drops of her milk falling upon them, and in

Cheshire we find the same idea connected with the pulmonaria or “lady's milk sile,” the word “sile” being a provincialism for “soil,” or “stain.” A German tradition makes the common fern (*Polypodium vulgare*) to have sprung from the Virgin's milk.

Numerous flowers have been identified with her dress, such as the marigold, termed by Shakespeare “Mary-bud,” which she wore in her bosom. The cuckoo-flower of our meadows is “Our Lady's smock,” which Shakespeare refers to in those charming lines in “Love's Labour's Lost,” where:—

“When daisies pied and violets blue,
And lady's smocks all silver white,
And cuckoo-buds of yellow hue
Do paint the meadows with delight,
The cuckoo then on every tree
Mocks married men, for thus sings he,
Cuckoo.”

And one of the finest of our orchids is “Our Lady's slipper.” The ribbon grass is “Our Lady's garters,” and the dodder supplies her “laces.” In the same way many flowers have been associated with the Virgin herself. Thus, there is “Our Lady's tresses,” and a popular name for the maiden-hair fern and quaking-grass is “Virgin's hair.” The lilies of the valley are her tears, and a German nickname for the lungwort is “Our Lady's milk-wort.” The *Anthyllis vulneraria* is “Our Lady's fingers,” and the kidney-wort has been designated “lady's navel.” Certain orchids, from the peculiar form of their hand-shaped roots, have been popularly termed “Our Lady's hands,” a name given in France to the dead-nettle.

Of the many other plants dedicated to the Virgin may be mentioned the snowdrop, popularly known as the “fair maid of February,” opening its floweret at the time of Candlemas. According to an old monkish tradition it blooms at this time, in memory of the Virgin having taken the child Jesus to the temple, and there presented her offering. A further reason for the snowdrop's association with the Virgin originated in the custom of removing her image from the altar on the day of the Purification, and strewing over the vacant place with these emblems of purity. The bleeding nun (*Cyclamen europoeum*) was consecrated to the Virgin, and in France the spearmint is termed “Our Lady's mint.” In Germany the costmary (*Costaminta vulgaris*) is “Our Lady's balsam,” the white-flowered wormwood the “smock of our Lady,” and in olden days the iris or fleur-de-lis was held peculiarly sacred.

The little pink is “lady's cushion,” and the campanula is her looking-glass. Then there is “Our Lady's comb,” with its long, fragile seed-vessels resembling the teeth of a comb, while the cowslip is “Our Lady's bunch of keys.” In France, the digitalis supplies her with gloves, and in days gone by the *Convallaria polygonatum* was the “Lady's seal.” According to some old writers, the black briony went by this name, and Hare gives this explanation:—“Our Lady's seal” (*Sigillum marioe*) is among the names of the black briony, owing to the great efficacy of its roots when spread in a plaster and applied as it were to heal up a scar or bruise.” Formerly a species of primula was known as “lady's candlestick,” and a Wiltshire nickname for the common convolvulus is “lady's nightcap,” Canterbury bells in some places supplying this need. The harebell is “lady's thimble,” and the plant which affords her a mantle is the *Alchemilla vulgaris*, with its grey-green leaf covered with a soft silky hair. This is the Maria Stakker of Iceland, which when placed under the pillow produces sleep.

Once more, the strawberry is one of the fruits that has been dedicated to her; and a species of nut, popularly known as the molluka bean, is in many parts called the “Virgin Mary's nut.” The cherry-tree, too, has long been consecrated to the Virgin from the following tradition:— Being desirous one day of refreshing herself with some cherries which she saw hanging upon a tree, she requested Joseph to gather some for her. But he hesitated, and mockingly said, “Let the father of thy child present them to you.” But these words had been no sooner uttered than the branch of the cherry-tree inclined itself of its own accord to the Virgin's hand. There are many other plants associated in one way or another with the Virgin, but the instances already given are representative of this wide subject. In connection, too, with her various festivals, we find numerous plants; and as the author of “Flower-lore” remarks, “to the Madonna were assigned the white iris, blossoming almond-tree, narcissus, and white lily, all appropriate to the Annunciation.” The flowers appropriate to the “Visitation of Our Lady” were, in

addition to the lily, roses red and white, while to the “Feast of Assumption” is assigned the “Virgin's bower,” “worthy to be so called,” writes Gerarde, “by reason of the goodly shadow which the branches make with their thick bushing and climbing, as also for the beauty of the flowers, and the pleasant scent and savour of the same.”

Many plants have been associated with St. John the Baptist, from his having been the forerunner of Christ. Thus, the common plant which bears his name, St. John's wort, is marked with blood-like spots, known as the “blood of St. John,” making their appearance on the day he was beheaded. The scarlet lychnis, popularly nicknamed the “great candlestick,” was commonly said to be lighted up for his day. The carob tree has been designated “St. John's bread,” from a tradition that it supplied him with food in the wilderness; and currants, from beginning to ripen at this time, have been nicknamed “berries of St. John.” The artemisia was in Germany “St. John's girdle,” and in Sicily was applied to his beard.

In connection with Christ's birth it may be noted that the early painters represent the Angel Gabriel with either a sceptre or spray of the olive tree, while in the later period of Italian art he has in his hand a branch of white lilies.

[11] The star which pointed out the place of His birth has long been immortalised by the *Ornithogalum umbellatum*, or Star of Bethlehem, which has been thought to resemble the pictures descriptive of it; in France there is a pretty legend of the rose-coloured sainfoin. When the infant Jesus was lying in the manger the plant was found among the grass and herbs which composed his bed. But suddenly it opened its pretty blossom, that it might form a wreath around His head. On this account it has been held in high repute. Hence the practice in Italy of decking mangers at Christmas time with moss, sow-thistle, cypress, and holly. [12]

Near the city of On there was shown for many centuries the sacred fig-tree, under which the Holy Family rested during their “Flight into Egypt,” and a Bavarian tradition makes the tree under which they found shelter a hazel. A German legend, on the other hand, informs us that as they took their flight they came into a thickly-wooded forest, when, on their approach, all the trees, with the exception of the aspen, paid reverential homage. The disrespectful arrogance of the aspen, however, did not escape the notice of the Holy Child, who thereupon pronounced a curse against it, whereupon its leaves began to tremble, and have done so ever since:—

“Once as our Saviour walked with men below,
His path of mercy through a forest lay;
And mark how all the drooping branches show
What homage best a silent tree may pay.

Only the aspen stood erect and free,
Scorning to join the voiceless worship pure,
But see! He cast one look upon the tree,
Struck to the heart she trembles evermore.”

The “rose of Jericho” has long been regarded with special reverence, having first blossomed at Christ's birth, closed at His crucifixion, and opened again at the resurrection. At the flight into Egypt it is reported to have sprung up to mark the footsteps of the sacred family, and was consequently designated Mary's rose. The pine protected them from Herod's soldiers, while the juniper opened its branches and offered a welcome shelter, although it afterwards, says an old legend, furnished the wood for the cross.

But some trees were not so thoughtful, for “the brooms and the chick-peas rustled and crackled, and the flax bristled up.” According to another old legend we are informed that by the fountain where the Virgin Mary washed the swaddling-clothes of her sacred infant, beautiful bushes sprang up in memory of the event. Among the many further legends connected with the Virgin may be mentioned the following connected with her death:—The story runs that she was extremely anxious to see her Son again, and that whilst weeping, an angel appeared, and said, “Hail, O Mary! I bring thee here a branch of palm, gathered in paradise; command that it be carried before thy bier in the day of thy death, for in three days thy soul shall leave thy body, and thou shalt enter into paradise, where thy Son awaits thy coming.” The angel then departed, but the palm-branch shed a light from every leaf, and the apostles, although scattered in different parts of the world, were miraculously caught up and

set down at the Virgin's door. The sacred palm-branch she then assigned to the care of St. John, who carried it before her bier at the time of her burial. ^[13]

The trees and flowers associated with the crucifixion are widely represented, and have given rise to many a pretty legend. Several plants are said to owe their dark-stained blossoms to the blood-drops which trickled from the cross; amongst these being the wood-sorrel, the spotted persicaria, the arum, the purple orchis, which is known in Cheshire as "Gethsemane," and the red anemone, which has been termed the "blood-drops of Christ." A Flemish legend, too, accounts in the same way for the crimson-spotted leaves of the rood-selken. The plant which has gained the unenviable notoriety of supplying the crown of thorns has been variously stated as the boxthorn, the bramble, the buckthorns, ^[14] and barberry, while Mr. Conway quotes an old tradition, which tells how the drops of blood that fell from the crown of thorns, composed of the rose-briar, fell to the ground and blossomed to roses. ^[15] Some again maintain that the wild hyssop was employed, and one plant which was specially signalled out in olden times is the auberpine or white-thorn. In Germany holly is Christ-thorn, and according to an Eastern tradition it was the prickly rush, but as Mr. King ^[16] remarks, "the belief of the East has been tolerably constant to what was possibly the real plant employed, the nabk (*Zizyphus spina-Christi*), a species of buckthorn." The negroes of the West Indies say that, "a branch of the cashew tree was used, and that in consequence one of the bright golden petals of the flower became black and blood-stained."

Then again, according to a Swedish legend, the dwarf birch tree afforded the rod with which Christ was scourged, which accounts for its stunted appearance; while another legend tells us it was the willow with its drooping branches. Rubens, together with the earlier Italian painters, depict the reed-mace ^[17] or bulrush (*Typha latifolia*) as the rod given to Him to carry; a plant still put by Catholics into the hands of statues of Christ. But in Poland, where the plant is difficult to procure, "the flower-stalk of the leek is substituted."

The mournful tree which formed the wood of the cross has always been a disputed question, and given rise to a host of curious legends. According to Sir John Maundeville, it was composed of cedar, cypress, palm, and olive, while some have instituted in the place of the two latter the pine and the box; the notion being that those four woods represented the four quarters of the globe. Foremost amongst the other trees to which this distinction has been assigned, are the aspen, poplar, oak, elder, and mistletoe. Hence is explained the gloomy shivering of the aspen leaf, the trembling of the poplar, and the popular antipathy to utilising elder twigs for fagots. But it is probable that the respect paid to the elder "has its roots in the old heathenism of the north," and to this day, in Denmark, it is said to be protected by "a being called the elder-mother," so that it is not safe to damage it in any way. ^[18] The mistletoe, which exists now as a mere parasite, was before the crucifixion a fine forest tree; its present condition being a lasting monument of the disgrace it incurred through its ignominious use. ^[19] A further legend informs us that when the Jews were in search of wood for the cross, every tree, with the exception of the oak, split itself to avoid being desecrated. On this account, Grecian woodcutters avoid the oak, regarding it as an accursed tree.

The bright blue blossoms of the speedwell, which enliven our wayside hedges in spring-time, are said to display in their markings a representation of the kerchief of St Veronica, imprinted with the features of Christ. ^[20] According to an old tradition, when our Lord was on His way to Calvary, bearing His Cross, He happened to pass by the door of Veronica, who, beholding the drops of agony on His brow, wiped His face with a kerchief or napkin. The sacred features, however, remained impressed upon the linen, and from the fancied resemblance of the blossom of the speedwell to this hallowed relic, the plant was named Veronica.

A plant closely connected by tradition with the crucifixion is the passion-flower. As soon as the early Spanish settlers in South America first glanced on it, they fancied they had discovered not only a marvellous symbol of Christ's passion, but received an assurance of the ultimate triumph of Christianity. Jacomo Bosio, who obtained his knowledge of it from certain Mexican Jesuits, speaks of it as "the flower of the five wounds," and has given a very minute description of it, showing how exactly every part is a picture of the mysteries of the Passion. "It would seem," he adds, "as if the Creator of the world had chosen it to represent the principal emblems of His Son's Passion; so that in due season it might assist, when its marvels should be explained to them, in the

condition of the heathen people, in whose country it grew.” In Brittany, vervain is popularly termed the “herb of the cross,” and when gathered with a certain formula is efficacious in curing wounds. [21]

In legendary lore, much uncertainty exists as to the tree on which Judas hanged himself. According to Sir John Maundeville, there it stood in the vicinity of Mount Sion, “the tree of eldre, that Judas henge himself upon, for despeyr,” a legend which has been popularly received. Shakespeare, in his “Love's Labour's Lost,” says “Judas was hanged on an elder,” and the story is further alluded to in Piers Plowman's vision:—

“Judas, he japed
With Jewen silver,
And sithen on an eller,
Hanged himselve.”

Gerarde makes it the wild carob, a tree which, as already stated, was formerly known as “St. John's bread,” from a popular belief that the Baptist fed upon it while in the wilderness. A Sicilian tradition identifies the tree as a tamarisk, and a Russian proverb, in allusion to the aspen, tells us “there is an accursed tree which trembles without even a breath of wind.” The fig, also, has been mentioned as the ill-fated tree, and some traditions have gone so far as to say that it was the very same one as was cursed by our Lord.

As might be expected, numerous plants have become interwoven with the lives of the saints, a subject on which many works have been written. Hence it is unnecessary to do more than briefly note some of the more important items of sacred lore which have been embodied in many of the early Christian legends. The yellow rattle has been assigned to St. Peter, and the *Primula veris*, from its resemblance to a bunch of keys, is St. Peter's wort. Many flowers, too, from the time of their blossoming, have been dedicated to certain saints, as the square St. John's wort (*Hypericum quadrangulare*), which is also known as St. Peter's wort; while in Germany wall-barley is termed Peter's corn. Of the many legends connected with the cherry we are reminded that on one occasion Christ gave one to St. Peter, at the same time reminding him not to despise little things.

St. James is associated with several plants—the St. James' wort (*Senecio Jacoboea*), either from its having been much used for the diseases of horses, of which the saint was the patron, or owing to its blossoming on his festival. The same name was applied to the shepherd's purse and the rag-weed. Incidentally, too, in our chapter on the calendar we have alluded to many flowers associated with the saints, and spoken of the customs observed in their honour.

Similarly the later saints had particular flowers dedicated to their memory; and, indeed, a complete catalogue of flowers has been compiled—one for each day in the year—the flower in many cases having been selected because it flowered on the festival of that saint. Thus the common bean was dedicated to St. Ignatius, and the blue hyacinth to St. Dorothy, while to St. Hilary the barren strawberry has been assigned. St. Anne is associated with the camomile, and St. Margaret with the Virginian dragon's head. Then there is St. Anthony's turnips and St. Barbara's cress—the “Saints' Floral Directory,” in “Hone's Every-Day Book,” giving a fuller and more extensive list. But the illustrations we have already given are sufficient to show how fully the names of the saints have been perpetuated by so many of our well-known plants not only being dedicated to, but named after them, a fact which is perhaps more abundantly the case on the Continent. Then, as it has been remarked, flowers have virtually become the timepieces of our religious calendar, reminding us of the various festivals, as in succession they return, in addition to immortalising the history and events which such festivals commemorate. In many cases, too, it should be remembered, the choice of flowers for dedication to certain saints originated either in their medical virtues or in some old tradition which was supposed to have specially singled them out for this honour.

Footnotes:

1. Sanscrit for lotus.
2. Hindu poem, translated by Sir William Jones.

3. "Flower-lore," p. 118.
4. Folkard's "Plant Legends," p. 245.
5. "Flower-lore," p. 120.
6. *Quarterly Review*, cxiv. 231.
7. "Flower-lore," p. 2.
8. Ibid.
9. *Quarterly Review*, cxiv. 235.
10. Ibid., p. 239.
11. "Flower-lore."
12. Folkard's "Plant Legends," p. 44.
13. Folkard's "Plant Legends," p. 395.
14. "Flower-lore," p. 13.
15. *Fraser's Magazine*, 1870, p. 714.
16. "Flower-lore," p. 14.
17. "Flower-lore," p. 14.
18. *Quarterly Review*, cxiv. 233; "Flower-lore," p. 15.
19. See Baring-Gould's "Myths of the Middle Ages."
20. "Flower-lore," p. 12.
21. See chapter on Folk-Medicine.

CHAPTER XX. PLANT SUPERSTITIONS.

The superstitious notions which, under one form or another, have clustered round the vegetable kingdom, hold a prominent place in the field of folk-lore. To give a full and detailed account of these survivals of bygone beliefs, would occupy a volume of no mean size, so thickly scattered are they among the traditions and legendary lore of almost every country. Only too frequently, also, we find the same superstition assuming a very different appearance as it travels from one country to another, until at last it is almost completely divested of its original dress. Repeated changes of this kind, whilst not escaping the notice of the student of comparative folk-lore, are apt to mislead the casual observer who, it may be, assigns to them a particular home in his own country, whereas probably they have travelled, before arriving at their modern destination, thousands of miles in the course of years.

There is said to be a certain mysterious connection between certain plants and animals. Thus, swine when affected with the spleen are supposed to resort to the spleen-wort, and according to Coles, in his "Art of Simpling," the ass does likewise, for he tells us that, "if the asse be oppressed with melancholy, he eates of the herbe asplemon or mill-waste, and eases himself of the swelling of the spleen." One of the popular names of the common sow-thistle (*Sonchus oleraceus*) is hare's-palace, from the shelter it is supposed to afford the hare. According to the "Grete Herbale," "if the hare come under it, he is sure that no beast can touch hym." Topsell

also, in his “Natural History,” alludes to this superstition:—“When hares are overcome with heat, they eat of an herb called *Latua leporina*, that is, hare's-lettuce, hare's-house, hare's-palace; and there is no disease in this beast the cure whereof she does not seek for in this herb.”

The hound's-tongue (*cynoglossum*) has been reputed to have the magical property of preventing dogs barking at a person, if laid beneath the feet; and Gerarde says that wild goats or deer, “when they be wounded with arrows, do shake them out by eating of this plant, and heal their wounds.” Bacon in his “Natural History” alludes to another curious idea connected with goats, and says, “There are some tears of trees, which are combed from the beards of goats; for when the goats bite and crop them, especially in the morning, the dew being on, the tear cometh forth, and hangeth upon their beards; of this sort is some kind of laudanum.” The columbine was once known as *Herba leonis*, from a belief that it was the lion's favourite plant, and it is said that when bears were half-starved by hybernating—having remained for days without food—they were suddenly restored by eating the arum. There is a curious tradition in Piedmont, that if a hare be sprinkled with the juice of henbane, all the hares in the neighbourhood will run away as if scared by some invisible power.

Gerarde also alludes to an old belief that cats, “Are much delighted with catmint, for the smell of it is so pleasant unto them, that they rub themselves upon it, and swallow or tumble in it, and also feed on the branches very greedily.” And according to an old proverb they have a liking for the plant maram:—

“If you set it, the cats will eat it;
If you sow it, the cats won't know it.”

Equally fond, too, are cats of valerian, being said to dig up the roots and gnaw them to pieces, an allusion to which occurs in Topsell's “Four-footed Beasts” (1658-81):—“The root of the herb valerian (commonly called Phu) is very like to the eye of a cat, and wheresoever it groweth, if cats come thereunto they instantly dig it up for the love thereof, as I myself have seen in mine own garden, for it smelleth moreover like a cat.”

Then there is the moonwort, famous for drawing the nails out of horses' shoes, and hence known by the rustic name of “unshoe the horse;” while the mouse-ear was credited with preventing the horses being hurt when shod.

We have already alluded to the superstitions relating to birds and plants, but may mention another relating to the celandine. One of the well-known names of this plant is swallow-wort, so termed, says Gerarde, not, “because it first springeth at the coming in of the swallows, or dieth when they go away, for it may be found all the year, but because some hold opinion that with this herbe the darns restore eyesight to their young ones, when their eye be put out.” Coles strengthens the evidence in favour of this odd notion by adding: “It is known to such as have skill of nature, what wonderful care she hath of the smallest creatures, giving to them a knowledge of medicine to help themselves, if haply diseases annoy them. The swallow cureth her dim eyes with celandine; the wesell knoweth well the virtue of herb-grace; the dove the verven; the dogge dischargeth his mawe with a kind of grasse,” &c.

In Italy cumin is given to pigeons for the purpose of taming them, and a curious superstition is that of the “divining-rod,” with “its versatile sensibility to water, ore, treasure and thieves,” and one whose history is apparently as remote as it is widespread. Francis Lenormant, in his “Chaldean Magic,” mentions the divining-rods used by the Magi, wherewith they foretold the future by throwing little sticks of tamarisk-wood, and adds that divination by wands was known and practised in Babylon, “and that this was even the most ancient mode of divination used in the time of the Accadians.” Among the Hindus, even in the Vedic period, magic wands were in use, and the practice still survives in China, where the peach-tree is in demand. Tracing its antecedent history in this country, it appears that the Druids were in the habit of cutting their divining-rods from the apple-tree; and various notices of this once popular fallacy occur from time to time, in the literature of bygone years.

The hazel was formerly famous for its powers of discernment, and it is still held in repute by the Italians. Occasionally, too, as already noticed, the divining-rod was employed for the purpose of detecting the locality of water, as is still the case in Wiltshire. An interesting case was quoted some years ago in the *Quarterly Review* (xxii. 273). A certain Lady N—is here stated to have convinced Dr. Hutton of her possession of this remarkable gift, and by means of it to have indicated to him the existence of a spring of water in one of his fields

adjoining the Woolwich College, which, in consequence of the discovery, he was enabled to sell to the college at a higher price. This power Lady N——repeatedly exhibited before credible witnesses, and the *Quarterly Review* of that day considered the fact indisputable. The divining-rod has long been in repute among Cornish miners, and Pryce, in his “*Mineralogia Cornubiensis*,” says that many mines have been discovered by this means; but, after giving a minute account of cutting, tying, and using it, he rejects it, because, “Cornwall is so plentifully stored with tin and copper lodes, that some accident every week discovers to us a fresh vein.”

Billingsley, in his “*Agricultural Survey of the County of Cornwall*,” published in the year 1797, speaks of the belief of the Mendip miners in the efficacy of the mystic rod:—“The general method of discovering the situation and direction of those seams of ore (which lie at various depths, from five to twenty fathoms, in a chasm between two inches of solid rock) is by the help of the divining-rod, vulgarly called *josing*; and a variety of strong testimonies are adduced in supporting this doctrine. So confident are the common miners of the efficacy, that they scarcely ever sink a shaft but by its direction; and those who are dexterous in the use of it, will mark on the surface the course and breadth of the vein; and after that, with the assistance of the rod, will follow the same course twenty times following blindfolded.” Anecdotes of the kind are very numerous, for there are few subjects in folk-lore concerning which more has been written than on the divining-rod, one of the most exhaustive being that of Mr. Baring-Gould in his “*Curious Myths of the Middle Ages*.” The literature, too, of the past is rich in allusions to this piece of superstition, and Swift in his “*Virtues of Sid Hamet the Magician's Rod*” (1710) thus refers to it:—

“They tell us something strange and odd
About a certain magic rod
That, bending down its top, divines
Whene'er the soil has golden mines;
Where there are none, it stands erect,
Scorning to show the least respect.
As ready was the wand of Sid
To bend where golden mines were hid.
In Scottish hills found precious ore,
Where none e'er looked for it before;
And by a gentle bow divined,
How well a Cully's purse was lined;
To a forlorn and broken rake,
Stood without motion like a stake.”

De Quincey has several amusing allusions to this fallacy, affirming that he had actually seen on more than one occasion the process applied with success, and declared that, in spite of all science or scepticism might say, most of the tea-kettles in the Vale of Wrington, North Somersetshire, are filled by rhabdomancy. But it must be admitted that the phenomena of the divining-rod and table-turning are of precisely the same character, both being referable to an involuntary muscular action resulting from a fixedness of idea. Moreover, it should be remembered that experiments with the divining-rod are generally made in a district known to be metalliferous, and therefore the chances are greatly in favour of its bending over or near a mineral lode. On the other hand, it is surprising how many people of culture have, at different times, in this and other countries, displayed a lamentable weakness in partially accepting this piece of superstition. Of the many anecdotes related respecting it, we may quote an amusing one in connection with the celebrated botanist, Linnaeus:—“When he was on one of his voyages, hearing his secretary highly extol the virtues of his divining-wand, he was willing to convince him of its insufficiency, and for that purpose concealed a purse of one hundred ducats under a ranunculus, which grew up by itself in a meadow, and bid the secretary find it if he could. The wand discovered nothing, and Linnaeus' mark was soon trampled down by the company who were present, so that when he went to finish the experiment by fetching the gold himself, he was utterly at a loss where to find it. The man with the wand assisted him, and informed him that it could not lie in the way they were going, but quite the contrary, so pursued the direction of the wand, and actually dug out the gold. Linnaeus thereupon added that such another experiment would be sufficient to make a proselyte of him.” [1]

In 1659, the Jesuit, Gaspard Schott, tells us that this magic rod was at this period used in every town in Germany, and that he had frequently had opportunities of seeing it used in the discovery of hidden treasure. He further adds:—"I searched with the greatest care into the question whether the hazel rod had any sympathy with gold and silver, and whether any natural property set it in motion. In like manner, I tried whether a ring of metal, held suspended by a thread in the midst of a tumbler, and which strikes the hours, is moved by any similar force." But many of the mysterious effects of these so-called divining-rods were no doubt due to clever imposture. In the year 1790, Plunet, a native of Dauphine, claimed a power over the divining-rod which attracted considerable attention in Italy. But when carefully tested by scientific men in Padua, his attempts to discover buried metals completely failed; and at Florence he was detected trying to find out by night what he had secreted to test his powers on the morrow. The astrologer Lilly made sundry experiments with the divining-rod, but was not always successful; and the Jesuit, Kircher, tried the powers of certain rods which were said to have sympathetic influences for particular metals, but they never turned on the approach of these. Once more, in the "Shepherd's Calendar," we find a receipt to make the "Mosaic wand to find hidden treasure" without the intervention of a human operator:—"Cut a hazel wand forked at the upper end like a Y. Peel off the rind, and dry it in a moderate heat, then steep it in the juice of wake-robin or nightshade, and cut the single lower end sharp; and where you suppose any rich mine or hidden treasure is near, place a piece of the same metal you conceive is hid, or in the earth, to the top of one of the forks by a hair, and do the like to the other end; pitch the sharp single end lightly to the ground at the going down of the sun, the moon being in the increase, and in the morning at sunrise, by a natural sympathy, you will find the metal inclining, as it were pointing, to the places where the other is hid."

According to a Tuscany belief, the almond will discover treasures; and the golden rod has long had the reputation in England of pointing to hidden springs of water, as well as to treasures of gold and silver. Similarly, the spring-wort and primrose—the key-flower—revealed the hidden recesses in mountains where treasures were concealed, and the mystic fern-seed, termed "wish-seed," was supposed in the Tyrol to make known hidden gold; and, according to a Lithuanian form of this superstition, one who secures treasures by this means will be pursued by adders, the guardians of the gold. Plants of this kind remind us of the magic "sesame" which, at the command of Ali Baba, in the story of the "Forty Thieves," gave him immediate admission to the secret treasure-cave. Once more, among further plants possessing the same mystic property may be mentioned the sow-thistle, which, when invoked, discloses hidden treasures. In Sicily a branch of the pomegranate tree is considered to be a most effectual means of ascertaining the whereabouts of concealed wealth. Hence it has been invested with an almost reverential awe, and has been generally employed when search has been made for some valuable lost property. In Silesia, Thuringia, and Bohemia the mandrake is, in addition to its many mystic properties, connected with the idea of hidden treasures.

Numerous plants are said to be either lucky or the reverse, and hence have given rise to all kinds of odd beliefs, some of which still survive in our midst, having come down from a remote period.

There is in many places a curious antipathy to uprooting the house-leek, some persons even disliking to let it blossom, and a similar prejudice seems to have existed against the cuckoo-flower, for, if found accidentally inverted in a May garland, it was at once destroyed. In Prussia it is regarded as ominous for a bride to plant myrtle, although in this country it has the reputation of being a lucky plant. According to a Somersetshire saying, "The flowering myrtle is the luckiest plant to have in your window, water it every morning, and be proud of it." We may note here that there are many odd beliefs connected with the myrtle. "Speaking to a lady," says a correspondent of the *Athenaeum* (Feb. 5, 1848), "of the difficulty which I had always found in getting a slip of myrtle to grow, she directly accounted for my failure by observing that perhaps I had not spread the tail or skirt of my dress, and looked proud during the time I was planting it. It is a popular belief in Somersetshire that unless a slip of myrtle is so planted, it will never take root." The deadly nightshade is a plant of ill omen, and Gerarde describing it says, "if you will follow my counsel, deal not with the same in any case, and banish it from your gardens, and the use of it also, being a plant so furious and deadly; for it bringeth such as have eaten thereof into a dead sleep, wherein many have died." There is a strong prejudice to sowing parsley, and equally a great dislike to transplanting it, the latter notion being found in South America. Likewise, according to a Devonshire belief, it is highly unlucky to plant a bed of lilies of the valley, as the person doing so will probably die in the course of the next twelve months.

The withering of plants has long been regarded ominous, and, according to a Welsh superstition, if there are faded leaves in a room where a baby is christened it will soon die. Of the many omens afforded by the oak, we are told that the change of its leaves from their usual colour gave more than once “fatal premonition” of coming misfortunes during the great civil wars; and Bacon mentions a tradition that “if the oak-apple, broken, be full of worms, it is a sign of a pestilent year.” In olden times the decay of the bay-tree was considered an omen of disaster, and it is stated that, previous to the death of Nero, though the winter was very mild, all these trees withered to the roots, and that a great pestilence in Padua was preceded by the same phenomenon. [2] Shakespeare speaks of this superstition:—

“‘Tis thought the king is dead; we will not stay,
The bay-trees in our county are all withered.”

Lupton, in his “Notable Things,” tells us that,

“If a fir-tree be touched, withered, or burned with lightning, it signifies that the master or mistress thereof shall shortly die.”

It is difficult, as we have already noted in a previous chapter, to discover why some of our sweetest and fairest spring-flowers should be associated with ill-luck. In the western counties, for instance, one should never take less than a handful of primroses or violets into a farmer's house, as neglect of this rule is said to affect the success of the ducklings and chickens. A correspondent of *Notes and Queries* (I. Ser. vii. 201) writes:—“My gravity was sorely tried by being called on to settle a quarrel between two old women, arising from one of them having given one primrose to her neighbour's child, for the purpose of making her hens hatch but one egg out of each set of eggs, and it was seriously maintained that the charm had been successful.” In the same way it is held unlucky to introduce the first snowdrop of the year into a house, for, as a Sussex woman once remarked, “It looks for all the world like a corpse in its shroud.” We may repeat, too, again the familiar adage:—

“If you sweep the house with blossomed broom in May,
You are sure to sweep the head of the house away.”

And there is the common superstition that where roses and violets bloom in autumn, it is indicative of some epidemic in the following year; whereas, if a white rose put forth unexpectedly, it is believed in Germany to be a sign of death in the nearest house; and in some parts of Essex there is a current belief that sickness or death will inevitably ensue if blossoms of the whitethorn be brought into a house; the idea in Norfolk being that no one will be married from the house during the year. Another ominous sign is that of plants shedding their leaves, or of their blossoms falling to pieces. Thus the peasantry in some places affirm that the dropping of the leaves of a peach-tree betokens a murrain; and in Italy it is held unlucky for a rose to do so. A well-known illustration of this superstition occurred many years ago in the case of the unfortunate Miss Bay, who was murdered at the piazza entrance of Covent Garden by Hackman (April 1779), the following account of which we quote from the “Life and Correspondence of M. G. Lewis”:— “When the carriage was announced, and she was adjusting her dress, Mr. Lewis happened to make some remark on a beautiful rose which Miss Kay wore in her bosom. Just as the words were uttered the flower fell to the ground. She immediately stooped to regain it, but as she picked it up, the red leaves scattered themselves on the carpet, and the stalk alone remained in her hand. The poor girl, who had been depressed in spirits before, was evidently affected by this incident, and said, in a slightly faltering voice, ‘I trust I am not to consider this as an evil omen!’ But soon rallying, she expressed to Mr. Lewis, in a cheerful tone, her hope that they would meet again after the theatre—a hope, alas! which it was decreed should not be realised.” According to a German belief, one who throws a rose into a grave will waste away.

There is a notion prevalent in Dorsetshire that a house wherein the plant “bergamot” is kept will never be free from sickness; and in Norfolk it is said to be unlucky to take into a house a bunch of the grass called “maiden-hair,” or, as it is also termed, “dudder-grass.” Among further plants of ill omen may be mentioned the bluebell (*Campanula rotundifolia*), which in certain parts of Scotland was called “The aul’ man’s bell,” and was regarded with a sort of dread, and commonly left unpulled. In Cumberland, about Cockermouth, the red campion (*Lychnis diurna*) is called “mother-die,” and young people believe that if plucked some misfortune will happen to their

parents. A similar belief attaches to the herb-robert (*Geranium robertianum*) in West Cumberland, where it is nicknamed “Death come quickly;” and in certain parts of Yorkshire there is a notion that if a child gather the germander speedwell (*Veronica chamaedrys*), its mother will die during the year. Herrick has a pretty allusion to the daffodil:—

“When a daffodil I see
Hanging down her head t'wards me,
Guess I may what I must be:
First, I shall decline my head;
Secondly, I shall be dead;
Lastly, safely buried.”

In Germany, the marigold is with the greatest care excluded from the flowers with which young women test their love-affairs; and in Austria it is held unlucky to pluck the crocus, as it draws away the strength.

An ash leaf is still frequently employed for invoking good luck, and in Cornwall we find the old popular formula still in use:—

“Even ash, I do thee pluck,
Hoping thus to meet good luck;
If no good luck I get from thee,
I shall wish thee on the tree.”

And there is the following well-known couplet:—

“With a four-leaved clover, a double-leaved ash, and a green-topped
leave,
You may go before the queen's daughter without asking leave.”

But, on the other hand, the finder of the five-leaved clover, it is said, will have bad luck.

In Scotland ^[3] it was formerly customary to carry on the person a piece of torch-fir for good luck—a superstition which, Mr. Conway remarks, is found in the gold-mines of California, where the men tip a cone with the first gold they discover, and keep it as a charm to ensure good luck in future.

Nuts, again, have generally been credited with propitious qualities, and have accordingly been extensively used for divination. In some mysterious way, too, they are supposed to influence the population, for when plentiful, there is said to be a corresponding increase of babies. In Russia the peasantry frequently carry a nut in their purses, from a belief that it will act as a charm in their efforts to make money. Sternberg, in his “Northamptonshire Glossary” (163), says that the discovery of a double nut, “presages well for the finder, and unless he mars his good fortune by swallowing both kernels, is considered an infallible sign of approaching 'luck.' The orthodox way in such cases consists in eating one, and throwing the other over the shoulder.”

The Icelanders have a curious idea respecting the mountain-ash, affirming that it is an enemy of the juniper, and that if one is planted on one side of a tree, and the other on the other, they will split it. It is also asserted that if both are kept in the same house it will be burnt down; but, on the other hand, there is a belief among some sailors that if rowan-tree be used in a ship, it will sink the vessel unless juniper be found on board. In the Tyrol, the *Osmunda regalis*, called “the blooming fern,” is placed over the door for good teeth; and Mr. Conway, too, in his valuable papers, to which we have been often indebted in the previous chapters, says that there are circumstances under which all flowers are injurious. “They must not be laid on the bed of a sick person, according to a Silesian superstition; and in Westphalia and Thuringia, no child under a year old must be permitted to wreath itself with flowers, or it will soon die. Flowers, says a common German saying, must in no case be laid on the mouth of a corpse, since the dead man may chew them, which would make him a 'Nachzehrer,' or one who draws his relatives to the grave after him.”

In Hungary, the burnet saxifrage (*Pimpinella saxifraga*) is a mystic plant, where it is popularly nicknamed Chaba's salve, there being an old tradition that it was discovered by King Chaba, who cured the wounds of fifteen thousand of his men after a bloody battle fought against his brother. In Hesse, it is said that with knots tied in willow one may slay a distant enemy; and the Bohemians have a belief that seven-year-old children will become beautiful by dancing in the flax. But many superstitions have clustered round the latter plant, it having in years gone by been a popular notion that it will only flower at the time of day on which it was originally sown. To spin on Saturday is said in Germany to bring ill fortune, and as a warning the following legend is among the household tales of the peasantry:—"Two old women, good friends, were the most industrious spinners in their village, Saturday finding them as engrossed in their work as on the other days of the week. At length one of them died, but on the Saturday evening following she appeared to the other, who, as usual, was busy at her wheel, and showing her burning hand, said:—

'See what I in hell have won,
Because on Saturday eve I spun.'"

Flax, nevertheless, is a lucky plant, for in Thuringia, when a young woman gets married, she places flax in her shoes as a charm against poverty. It is supposed, also, to have health-giving virtues; for in Germany, when an infant seems weakly and thrives slowly, it is placed naked upon the turf on Midsummer day, and flax-seed is sprinkled over it; the idea being that as the flax-seed grows so the infant will gradually grow stronger. Of the many beliefs attached to the ash-tree, we are told in the North of England that if the first parings of a child's nails be buried beneath its roots, it will eventually turn out, to use the local phrase, a "top-singer," and there is a popular superstition that wherever the purple honesty (*Lunaria biennis*) flourishes, the cultivators of the garden are noted for their honesty. The snapdragon, which in years gone by was much cultivated for its showy blossoms, was said to have a supernatural influence, and amongst other qualities to possess the power of destroying charms. Many further illustrations of this class of superstition might easily be added, so thickly interwoven are they with the history of most of our familiar wild-flowers. One further superstition may be noticed, an allusion to which occurs in "Henry V." (Act i. sc. i):—

"The strawberry grows underneath the nettle,
And wholesome berries thrive and ripen best
Neighbour'd by fruit of baser quality;"

It having been the common notion that plants were affected by the neighbourhood of other plants to such an extent that they imbibed each other's virtues and faults. Accordingly sweet flowers were planted near fruit-trees, with the idea of improving the flavour of the fruit; and, on the other hand, evil-smelling trees, like the elder, were carefully cleaned away from fruit-trees, lest they should become tainted. ^[4] Further superstitions have been incidentally alluded to throughout the present volume, necessarily associated as they are with most sections of plant folk-lore. It should also be noticed that in the various folk-tales which have been collected together in recent years, many curious plant superstitions are introduced, although, to suit the surroundings of the story, they have only too frequently been modified, or the reverse. At the same time, embellishments of the kind are interesting, as showing how familiar these traditionary beliefs were in olden times to the story-teller, and how ready he was to avail himself of them.

Footnotes:

1. See Baring-Gerald's "Curious Myths of the Middle Ages."
2. Ingram's "Florica Symbolica," p. 326.
3. Stewart's "Popular Superstitions of the Highlanders."
4. See Ellacombe's "Plant-lore of Shakespeare," p. 319.

CHAPTER XXI. PLANTS IN FOLK-MEDICINE.

From the earliest times plants have been most extensively used in the cure of disease, although in days of old it was not so much their inherent medicinal properties which brought them into repute as their supposed magical virtues. Oftentimes, in truth, the only merit of a plant lay in the charm formula attached to it, the due utterance of which ensured relief to the patient. Originally there can be no doubt that such verbal forms were prayers, “since dwindled into mystic sentences.” [1] Again, before a plant could work its healing powers, due regard had to be paid to the planet under whose influence it was supposed to be; [2] for Aubrey mentions an old belief that if a plant “be not gathered according to the rules of astrology, it hath little or no virtue in it.” Hence, in accordance with this notion, we find numerous directions for the cutting and preparing of certain plants for medicinal purposes, a curious list of which occurs in Culpepper's “British Herbal and Family Physician.” This old herbalist, who was a strong believer in astrology, tells us that such as are of this way of thinking, and none else, are fit to be physicians. But he was not the only one who had strict views on this matter, as the literature of his day proves—astrology, too, having held a prominent place in most of the gardening books of the same period. Michael Drayton, who has chronicled so many of the credulities of his time, referring to the longevity of antediluvian men, writes:—

“Besides, in medicine, simples had the power
That none need then the planetary hour
To help their workinge, they so juiceful were.”

The adder's-tongue, if plucked during the wane of the moon, was a cure for tumours, and there is a Swabian belief that one, “who on Friday of the full moon pulls up the amaranth by the root, and folding it in a white cloth, wears it against his naked breast, will be made bullet-proof.” [3] Consumptive patients, in olden times, were three times passed, “Through a circular wreath of woodbine, cut during the increase of the March moon, and let down over the body from head to foot.” [4] In France, too, at the present day, the vervain is gathered under the different changes of the moon, with secret incantations, after which it is said to possess remarkable curative properties.

In Cornwall, the club-moss, if properly gathered, is considered “good against all diseases of the eye.” The mode of procedure is this:—“On the third day of the moon, when the thin crescent is seen for the first time, show it the knife with which the moss is to be cut, and repeat this formula:—

'As Christ healed the issue of blood,
Do thou cut what thou cuttest for good.'

At sundown, the operator, after carefully washing his hands, is to cut the club-moss kneeling. It is then to be wrapped in a white cloth, and subsequently boiled in water taken from the spring nearest to its place of growth. This may be used as a fomentation, or the club-moss may be made into an ointment with the butter from the milk of a new cow.” [5]

Some plants have, from time immemorial, been much in request from the season or period of their blooming, beyond which fact it is difficult to account for the virtues ascribed to them. Thus, among the Romans, the first anemone of the year, when gathered with this form of incantation, “I gather thee for a remedy against disease,” was regarded as a preservative from fever; a survival of which belief still prevails in our own country:—

“The first spring-blown anemone she in his doublet wove,
To keep him safe from pestilence wherever he should rove.”

On the other hand, in some countries there is a very strong prejudice against the wild anemone, the air being said “to be so tainted by them, that they who inhale it often incur severe sickness.” [6] Similarly we may compare the notion that flowers blooming out of season have a fatal significance, as we have noted elsewhere.

The sacred associations attached to many plants have invested them, at all times, with a scientific repute in the healing art, instances of which may be traced up to a very early period. Thus, the peony, which, from its

mythical divine origin, was an important flower in the primitive pharmacopoeia, has even in modern times retained its reputation; and to this day Sussex mothers put necklaces of beads turned from the peony root around their children's necks, to prevent convulsions and to assist them in their teething. When worn on the person, it was long considered, too, a most effectual remedy for insanity, and Culpepper speaks of its virtues in the cure of the falling sickness. [7] The thistle, sacred to Thor, is another plant of this kind, and indeed instances are very numerous. On the other hand, some plants, from their great virtues as “all-heals,” it would seem, had such names as “Angelica” and “Archangel” bestowed on them. [8]

In later times many plants became connected with the name of Christ, and with the events of the crucifixion itself—facts which occasionally explain their mysterious virtues. Thus the vervain, known as the “holy herb,” and which was one of the sacred plants of the Druids, has long been held in repute, the subjoined rhyme assigning as the reason:—

“All hail, thou holy herb, vervin,
Growing on the ground;
On the Mount of Calvary
There wast thou found;
Thou helpest many a grief,
And staunchest many a wound.
In the name of sweet Jesu,
I lift thee from the ground.”

To quote one or two further instances, a popular recipe for preventing the prick of a thorn from festering is to repeat this formula:—

“Christ was of a virgin born,
And he was pricked with a thorn,
And it did neither bell nor swell,
And I trust in Jesus this never will.”

In Cornwall, some years ago, the following charm was much used, forms of which may occasionally be heard at the present day:—

“Happy man that Christ was born,
He was crowned with a thorn;
He was pierced through the skin,
For to let the poison in.
But His five wounds, so they say,
Closed before He passed away.
In with healing, out with thorn,
Happy man that Christ was born.”

Another version used in the North of England is this:—

“Unto the Virgin Mary our Saviour was horn,
And on his head he wore a crown of thorn;
If you believe this true, and mind it well,
This hurt will never fester nor swell.”

The *Angelica sylvestris* was popularly known as “Holy Ghost,” from the angel-like properties therein having been considered good “against poisons, pestilent agues, or the pestilence.”

Cockayne, in his “Saxon Leechdoms,” mentions an old poem descriptive of the virtues of the mugwort:—

“Thou hast might for three,
And against thirty,
For venom availest
For plying vile things.”

So, too, certain plants of the saints acquired a notoriety for specific virtues; and hence St. John's wort, with its leaves marked with blood-like spots, which appear, according to tradition, on the anniversary of his decollation, is still “the wonderful herb” that cures all sorts of wounds. Herb-bennet, popularly designated “Star of the earth,” a name applied to the avens, hemlock, and valerian, should properly be, says Dr. Prior, “St. Benedict's herb, a name assigned to such plants as were supposed to be antidotes, in allusion to a legend of this saint, which represents that upon his blessing a cup of poisoned wine which a monk had given to destroy him, the glass was shivered to pieces.” In the same way, herb-gerard was called from St. Gerard, who was formerly invoked against gout, a complaint for which this plant was once in high repute. St. James's wort was so called from its being used for the diseases of horses, of which this great pilgrim-saint was the patron. It is curious in how many unexpected ways these odd items of folk-lore in their association with the saints meet us, showing that in numerous instances it is entirely their association with certain saints that has made them of medical repute.

Some trees and plants have gained a medical notoriety from the fact of their having a mystical history, and from the supernatural qualities ascribed to them. But, as Bulwer-Lytton has suggested in his “Strange Story,” the wood of certain trees to which magical properties are ascribed may in truth possess virtues little understood, and deserving of careful investigation. Thus, among these, the rowan would take its place, as would the common hazel, from which the miner's divining-rod is always cut. ^[9] An old-fashioned charm to cure the bite of an adder was to lay a cross formed of two pieces of hazel-wood on the ground, repeating three times this formula ^[10]:—

“Underneath this hazelin mote,
There's a braggotty worm with a speckled throat,
Nine double is he;
Now from nine double to eight double
And from eight double to seven double-ell.”

The mystical history of the apple accounts for its popularity as a medical agent, although, of course, we must not attribute all the lingering rustic cures to this source. Thus, according to an old Devonshire rhyme,

“Eat an apple going to bed,
Make the doctor beg his bread.”

Its juice has long been deemed potent against warts, and a Lincolnshire cure for eyes affected by rheumatism or weakness is a poultice made of rotten apples.

The oak, long famous for its supernatural strength and power, has been much employed in folk-medicine. A German cure for ague is to walk round an oak and say:—

“Good evening, thou good one old;
I bring thee the warm and the cold.”

Similarly, in our own country, oak-trees planted at the junction of cross-roads were much resorted to by persons suffering from ague, for the purpose of transferring to them their complaint, ^[11] and elsewhere allusion has already been made to the practice of curing sickly children by passing through a split piece of oak. A German remedy for gout is to take hold of an oak, or of a young shoot already felled, and to repeat these words:—

“Oak-shoot, I to thee complain,
All the torturing gout plagues me;
I cannot go for it,
Thou canst stand it.

The first bird that flies above thee,
To him give it in his flight,
Let him take it with him in the air.”

Another plant, which from its mystic character has been used for various complaints, is the elder. In Bohemia, three spoonfuls of the water which has been used to bathe an invalid are poured under an elder-tree; and a Danish cure for toothache consists in placing an elder-twigg in the mouth, and then sticking it in a wall, saying, “Depart, thou evil spirit.” The mysterious origin and surroundings of the mistletoe have invested it with a widespread importance in old folk-lore remedies, many of which are, even now-a-days, firmly credited; a reputation, too, bestowed upon it by the Druids, who styled it “all-heal,” as being an antidote for all diseases. Culpepper speaks of it as “good for the grief of the sinew, itch, sores, and toothache, the biting of mad dogs and venomous beasts;” while Sir Thomas Browne alludes to its virtues in cases of epilepsy. In France, amulets formed of mistletoe were much worn; and in Sweden, a finger-ring made of its wood is an antidote against sickness. The mandrake, as a mystic plant, was extensively sold for medicinal purposes, and in Kent may be occasionally found kept to cure barrenness; ^[12] and it may be remembered that La Fontaine's fable, *La Mandragore*, turns upon its supposed power of producing children. How potent its effects were formerly held may be gathered from the very many allusions to its mystic properties in the literature of bygone years. Columella, in his well-known lines, says:—

“Whose roots show half a man, whose juice
With madness strikes.”

Shakespeare speaks of it as an opiate, and on the Continent it was much used for amulets.

Again, certain plants seem to have been specially in high repute in olden times from the marvellous influence they were credited with exercising over the human frame; consequently they were much valued by both old and young; for who would not retain the vigour of his youth, and what woman would not desire to preserve the freshness of her beauty?

One of the special virtues of rosemary, for instance, was its ability to make old folks young again. A story is told of a gouty and crooked old queen, who sighed with longing regret to think that her young dancing-days were gone, so:—

“Of rosmaryn she took six pownde,
And grounde it well in a stownde,”

And then mixed it with water, in which she bathed three times a day, taking care to anoint her head with “gode balm” afterwards. In a very short time her old flesh fell away, and she became so young, tender, and fresh, that she began to look out for a husband. ^[13]

The common fennel (*Foeniculum vulgare*) was supposed to give strength to the constitution, and was regarded as highly restorative. Longfellow, in his “Goblet of Life,” apparently alludes to our fennel:—

“Above the lowly plant it towers,
The fennel, with its yellow flowers;
And in an earlier age than ours
Was gifted with the wondrous powers
Lost vision to restore.

It gave new strength and fearless mood,
And gladiators, fierce and rude,
Mingled it in their daily food,
And he who battled and subdued,
The wreath of fennel wore.”

The lady's-mantle, too (*Alchemilla vulgaris*), was once in great request, for, according to Hoffman, it had the power of “restoring feminine beauty, however faded, to its early freshness;” and the wild tansy (*Tanacetum vulgare*), laid to soak in buttermilk for nine days, had the reputation of “making the complexion very fair.” [14] Similarly, also, the great burnet saxifrage was said to remove freckles; and according to the old herbalists, an infusion of the common centaury (*Erythraea centaurium*) possessed the same property. [15] The hawthorn, too, was in repute among the fair sex, for, according to an old piece of proverbial lore:—

“The fair maid who, the first of May,
Goes to the fields at break of day,
And washes in dew from the hawthorn tree,
Will ever after handsome be;”

And the common fumitory, “was used when gathered in wedding hours, and boiled in water, milk, and whey, as a wash for the complexion of rustic maids.” [16] In some parts of France the water-hemlock (*Oenanthe crocata*), known with us as the “dead-tongue,” from its paralysing effects on the organs of voice, was used to destroy moles; and the yellow toad-flax (*Linaria vulgaris*) is described as “cleansing the skin wonderfully of all sorts of deformity.” Another plant of popular renown was the knotted figwort (*Scrophularia nodosa*), for Gerarde censures “divers who doe rashly teach that if it be hanged about the necke, or else carried about one, it keepeth a man in health.” Coles, speaking of the mugwort (*Artemisia vulgaris*), says that, “if a footman take mugwort and put it in his shoes in the morning, he may go forty miles before noon and not be weary;” but as far back as the time of Pliny its remarkable properties were known, for he says, “The wayfaring man that hath the herb tied about him feeleth no weariness at all, and he can never be hurt by any poisonous medicine, by any wild beast, neither yet by the sun itself.” The far-famed betony was long credited with marvellous medicinal properties, and hence the old saying which recommends a person when ill “to sell his coat and buy betony.” A species of thistle was once believed to have the curious virtue of driving away melancholy, and was hence termed the “melancholy thistle.” According to Dioscorides, “the root borne about one doth expel melancholy and remove all diseases connected therewith,” but it was to be taken in wine.

On the other hand, certain plants have been credited at most periods with hurtful and injurious properties. Thus, there is a popular idea that during the flowering of the bean more cases of lunacy occur than at any other season. [17] It is curious to find the apple—such a widespread curative—regarded as a bane, an illustration of which is given by Mr. Conway. [18] In Swabia it is said that an apple plucked from a graft on the whitethorn will, if eaten by a pregnant woman, increase her pains. On the Continent, the elder, when used as a birch, is said to check boys' growth, a property ascribed to the knot-grass, as in Beaumont and Fletcher's “Coxcomb” (Act ii. sc. 2):—

“We want a boy extremely for this function,
Kept under for a year with milk and knot-grass.”

The cat-mint, when chewed, created quarrelsomeness, a property said by the Italians to belong to the rampion.

Occasionally much attention in folk-medicine has been paid to lucky numbers; a remedy, in order to prove efficacious, having to be performed in accordance with certain numerical rules. In Devonshire, poultices must be made of seven different kinds of herbs, and a cure for thrush is this:—“Three rushes are taken from any running stream, passed separately through the mouth of the infant, and then thrown back into the water. As the current bears them away, so, it is believed, will the thrush leave the child.”

Similarly, in Brandenburg, if a person is afflicted with dizziness, he is recommended to run after sunset, naked, three times through a field of flax; after doing so, the flax will at once “take the dizziness to itself.” A Sussex cure for ague is to eat sage leaves, fasting, nine mornings in succession; while Flemish folk-lore enjoins any one who has the ague to go early in the morning to an old willow, make three knots in one of its branches, and say “Good morrow, old one; I give thee the cold; good morrow, old one.” A very common cure for warts is to tie as many knots on a hair as there are warts, and to throw the hair away; while an Irish charm is to give the patient nine leaves of dandelion, three leaves being eaten on three successive mornings. Indeed, the efficacy of numbers

is not confined to any one locality; and Mr. Folkard ^[19] mentions an instance in Cuba where, “thirteen cloves of garlic at the end of a cord, worn round the neck for thirteen days, are considered a safeguard against jaundice.” It is necessary, however, that the wearer, in the middle of the night of the thirteenth day, should proceed to the corner of two streets, take off his garlic necklet, and, flinging it behind him, run home without turning round to see what has become of it. Similarly, six knots of elderwood are employed “in a Yorkshire incantation to ascertain if beasts are dying from witchcraft.” ^[20] In Thuringia, on the extraction of a tooth, the person must eat three daisies to be henceforth free from toothache. In Cornwall ^[21] bramble leaves are made use of in cases of scalds and inflammatory diseases. Nine leaves are moistened with spring-water, and “these are applied to the burned or diseased parts.” While this is being done, for every bramble leaf the following charm is repeated three times:—

“There came three angels out of the east,
One brought fire and two brought frost;
Out fire and in frost,
In the name of the Father, Son, and Holy Ghost.”

Of the thousand and one plants used in popular folk-medicine we can but give a few illustrations, so numerous are these old cures for the ills to which flesh is heir. Thus, for deafness, the juice of onion has been long recommended, and for chilblains, a Derbyshire cure is to thrash them with holly, while in some places the juice of the leek mixed with cream is held in repute. To exterminate warts a host of plants have been recommended; the juice of the dandelion being in favour in the Midland counties, whereas in the North, one has but to hang a snail on a thorn, and as the poor creature wastes away the warts will disappear. In Leicestershire the ash is employed, and in many places the elder is considered efficacious. Another old remedy is to prick the wart with a gooseberry thorn passed through a wedding-ring; and according to a Cornish belief, the first blackberry seen will banish warts. Watercress laid against warts was formerly said to drive them away. A rustic specific for whooping-cough in Hampshire is to drink new milk out of a cup made of the variegated holly; while in Sussex the excrescence found on the briar, and popularly known as “robin red-breast's cushion,” is in demand. In consumption and diseases of the lungs, St. Fabian's nettle, the crocus, the betony, and horehound, have long been in request, and sea-southern-wood or mugwort, occasionally corrupted into “muggons,” was once a favourite prescription in Scotland. A charming girl, whom consumption had brought to the brink of the grave, was lamented by her lover, whereupon a good-natured mermaid sang to him:—

“Wad ye let the bonnie May die in your hand,
And the mugwort flowering i' the land?”

Thereupon, tradition says, he administered the juice of this life-giving plant to his fair lady-love, who “arose and blessed the bestower for the return of health.” Water in which peas have been boiled is given for measles, and a Lincolnshire recipe for cramp is cork worn on the person. A popular cure for ringworm in Scotland is a decoction of sun-spurge (*Euphorbia helioscopia*), or, as it is locally termed, “mare's milk.” In the West of England to bite the first fern seen in spring is an antidote for toothache, and in certain parts of Scotland the root of the yellow iris chopped up and chewed is said to afford relief. Some, again, recommend a double hazel-nut to be carried in the pocket, ^[22] and the elder, as a Danish cure, has already been noticed.

Various plants were, in days gone by, used for the bites of mad dogs and to cure hydrophobia. Angelica, madworts, and several forms of lichens were favourite remedies. The root of balaustrium, with storax, cypress-nuts, soot, olive-oil, and wine was the receipt, according to Bonaventura, of Cardinal Richelieu. Among other popular remedies were beetroot, box leaves, cabbage, cucumbers, black currants, digitalis, and euphorbia. ^[23] A Russian remedy was *Genista sentoria*, and in Greece rose-leaves were used internally and externally as a poultice. Horse-radish, crane's-bill, strawberry, and herb-gerard are old remedies for gout, and in Westphalia apple-juice mixed with saffron is administered for jaundice; while an old remedy for boils is dock-tea. For ague, cinquefoil and yarrow were recommended, and tansy leaves are worn in the shoe by the Sussex peasantry; and in some places common groundsel has been much used as a charm. Angelica was in olden times used as an antidote for poisons. The juice of the arum was considered good for the plague, and Gerarde tells us that Henry

VIII. was, “wont to drink the distilled water of broom-flowers against surfeits and diseases thereof arising.” An Irish recipe for sore-throat is a cabbage leaf tied round the throat, and the juice of cabbage taken with honey was formerly given as a cure for hoarseness or loss of voice. ^[24] Agrimony, too, was once in repute for sore throats, cancers, and ulcers; and as far back as the time of Pliny the almond was given as a remedy for inebriety. For rheumatism the burdock was in request, and many of our peasantry keep a potato in their pocket as charms, some, again, carrying a chestnut, either begged or stolen. As an antidote for fevers the carnation was prescribed, and the cowslip, and the hop, have the reputation of inducing sleep. The dittany and plantain, like the golden-rod, nicknamed “wound-weed,” have been used for the healing of wounds, and the application of a dock-leaf for the sting of a nettle is a well-known cure among our peasantry, having been embodied in the old familiar adage:

“Nettle out, dock in—
Dock remove the nettle-sting,”

Of which there are several versions; as in Wiltshire, where the child uses this formula:—

“Out 'ettle
In dock.
Dock shall ha'a a new smock,
'Ettle zbant
Ha' nanun.”

The young tops of the common nettle are still made by the peasantry into nettle-broth, and, amongst other directions enjoined in an old Scotch rhyme, it is to be cut in the month of June, “ere it's in the blume”:—

“Cou' it by the auld wa's,
Cou' it where the sun ne'er fa'
Stoo it when the day daws,
Cou' the nettle early.”

The juice of fumitory is said to clear the sight, and the kennel-wort was once a popular specific for the king's-evil. As disinfectants, wormwood and rue were much in demand; and hence Tusser says:—

“What savour is better, if physicke be true,
For places infected, than wormwood and rue?”

For depression, thyme was recommended, and a Manx preservative against all kinds of infectious diseases is ragwort. The illustrations we have given above show in how many ways plants have been in demand as popular curatives. And although an immense amount of superstition has been interwoven with folk-medicine, there is a certain amount of truth in the many remedies which for centuries have been, with more or less success, employed by the peasantry, both at home and abroad.

Footnotes:

1. See Tylor's “Primitive Culture,” ii.
2. See Folkard's “Plant-lore Legends and Lyrics,” p. 164.
3. “Mystic Trees and Shrubs,” p. 717.
4. Folkard's “Plant-lore,” p. 379.
5. Hunt's “Popular Romances of the West of England,” 1871, p. 415
6. Folkard's “Plant-lore Legends and Lyrics,” p. 216.

7. See Black's "Folk-medicine," 1883, p.195.
8. *Quarterly Review*, cxiv. 245.
9. "Sacred Trees and Flowers," *Quarterly Review*, cxiv. 244.
10. Folkard's "Plant Legends," 364.
11. *Fraser's Magazine*, 1870, p. 591.
12. "Mystic Trees and Plants," *Fraser's Magazine*, 1870, p. 708.
13. "Reliquiae Antiquae," Wright and Halliwell, i. 195; *Quarterly Review*, 1863, cxiv. 241.
14. Coles, "The Art of Simpling," 1656.
15. Anne Pratt's "Flowering Plants of Great Britain," iv. 9.
16. Black's "Folk-medicine," p. 201.
17. Folkard's "Plant-Lore Legends and Lyrics," p. 248.
18. *Fraser's Magazine*, 1870, p. 591.
19. "Plant-Lore Legends and Lyrics," p. 349.
20. Black's "Folk-medicine," p. 185.
21. See Hunt's "Popular Romances of the West of England."
22. Black's "Folk-medicine," p. 193.
23. "Rabies or Hydrophobia," T. M. Dolan, 1879, p. 238.
24. Black's "Folk-medicine," p. 193.

CHAPTER XXII. PLANTS AND THEIR LEGENDARY HISTORY.

Many of the legends of the plant-world have been incidentally alluded to in the preceding pages. Whether we review their mythological history as embodied in the traditionary stories of primitive times, or turn to the existing legends of our own and other countries in modern times, it is clear that the imagination has at all times bestowed some of its richest and most beautiful fancies on trees and flowers. Even, too, the rude and ignorant savage has clothed with graceful conceptions many of the plants which, either for their grandeur or utility, have attracted his notice. The old idea, again, of metamorphosis, by which persons under certain peculiar cases were changed into plants, finds a place in many of the modern plant-legends. Thus there is the well-known story of the wayside plantain, commonly termed "way-bread," which, on account of its so persistently haunting the track of man, has given rise to the German story that it was formerly a maiden who, whilst watching by the wayside for her lover, was transformed into this plant. But once in seven years it becomes a bird, either the cuckoo, or the cuckoo's servant, the "dinnick," as it is popularly called in Devonshire, the German "wiedhopf" which is said to follow its master everywhere.

This story of the plantain is almost identical with one told in Germany of the endive or succory. A patient girl, after waiting day by day for her betrothed for many a month, at last, worn out with watching, sank exhausted by the wayside and expired. But before many days had passed, a little flower with star-like blossoms sprang up on the spot where the broken-hearted maiden had breathed her final sigh, which was henceforth known as the

“Wegewarte,” the watcher of the road. Mr. Folkard quotes an ancient ballad of Austrian Silesia which recounts how a young girl mourned for seven years the loss of her lover, who had fallen in war. But when her friends tried to console her, and to procure for her another lover, she replied, “I shall cease to weep only when I become a wild-flower by the wayside.” By the North American Indians, the plantain or “way-bread” is “the white man's foot,” to which Longfellow, in speaking of the English settlers, alludes in his “Hiawatha”:—

“Wheresoe'er they move, before them
Swarms the stinging fly, the Ahmo,
Swarms the bee, the honey-maker;
Wheresoe'er they tread, beneath them
Springs a flower unknown among us,
Springs the white man's foot in blossom.”

Between certain birds and plants there exists many curious traditions, as in the case of the nightingale and the rose. According to a piece of Persian folklore, whenever the rose is plucked, the nightingale utters a plaintive cry, because it cannot endure to see the object of its love injured. In a legend told by the Persian poet Attar, we are told how all the birds appeared before Solomon, and complained that they were unable to sleep from the nightly wailings of the nightingale. The bird, when questioned as to the truth of this statement, replied that his love for the rose was the cause of his grief. Hence this supposed love of the nightingale for the rose has been frequently the subject of poetical allusion. Lord Byron speaks of it in the “Giaour”:—

“The rose o'er crag or vale,
Sultana of the nightingale,
The maid for whom his melody,
His thousand songs are heard on high,
Blooms blushing to her lover's tale,
His queen, the garden queen, his rose,
Unbent by winds, unchilled by snows.”

Thackeray, too, has given a pleasing rendering of this favourite legend:—

“Under the boughs I sat and listened still,
I could not have my fill.
'How comes,' I said, 'such music to his bill?
Tell me for whom he sings so beautiful a trill.’

'Once I was dumb,' then did the bird disclose,
'But looked upon the rose,
And in the garden where the loved one grows,
I straightway did begin sweet music to compose.”

Mrs. Browning, in her “Lay of the Early Rose,” alludes to this legend, and Moore in his “Lalla Rookh” asks:—

“Though rich the spot
With every flower this earth has got,
What is it to the nightingale,
If there his darling rose is not?”

But the rose is not the only plant for which the nightingale is said to have a predilection, there being an old notion that its song is never heard except where cowslips are to be found in profusion. Experience, however, only too often proves the inaccuracy of this assertion. We may also quote the following note from Yarrell's “British Birds” (4th ed., i. 316):—“Walcott, in his 'Synopsis of British Birds' (vol. ii. 228), says that the nightingale has been observed to be met with only where the *cowslip* grows kindly, and the assertion receives a partial approval from Montagu; but whether the statement be true or false, its converse certainly cannot be maintained, for Mr. Watson gives the cowslip (*Primula veris*) as found in all the 'provinces' into which he

divides Great Britain, as far north as Caithness and Shetland, where we know that the nightingale does not occur.” A correspondent of *Notes and Queries* (5th Ser. ix. 492) says that in East Sussex, on the borders of Kent, “the cowslip is quite unknown, but nightingales are as common as blackberries there.”

A similar idea exists in connection with hops; and, according to a tradition current in Yorkshire, the nightingale made its first appearance in the neighbourhood of Doncaster when hops were planted. But this, of course, is purely imaginary, and in Hargrove's “History of Knaresborough” (1832) we read: “In the opposite wood, called Birkans Wood (opposite to the Abbey House), during the summer evenings, the nightingale:—

'Sings darkling, and, in shadiest covert hid,
Tunes her nocturnal lay.’“

Of the numerous stories connected with the origin of the mistletoe, one is noticed by Lord Bacon, to the effect that a certain bird, known as the “missel-bird,” fed upon a particular kind of seed, which, through its incapacity to digest, it evacuated whole, whereupon the seed, falling on the boughs of trees, vegetated and produced the mistletoe. The magic springwort, which reveals hidden treasures, has a mysterious connection with the woodpecker, to which we have already referred. Among further birds which are in some way or other connected with plants is the eagle, which plucks the wild lettuce, with the juice of which it smears its eyes to improve its vision; while the hawk was supposed, for the same purpose, to pluck the hawk-bit.

Similarly, writes Mr. Folkard, ^[1] pigeons and doves made use of vervain, which was termed “pigeon's-grass.” Once more, the cuckoo, according to an old proverbial rhyme, must eat three meals of cherries before it ceases its song; and it was formerly said that orchids sprang from the seed of the thrush and the blackbird. Further illustrations might be added, whereas some of the many plants named after well-known birds are noticed elsewhere.

An old Alsatian belief tells us that bats possessed the power of rendering the eggs of storks unfruitful. Accordingly, when once a stork's egg was touched by a bat it became sterile; and in order to preserve it from the injurious influence, the stork placed in its nest some branches of the maple, which frightened away every intruding bat. ^[2] There is an amusing legend of the origin of the bramble:—The cormorant was once a wool merchant. He entered into partnership with the bramble and the bat, and they freighted a large ship with wool. She was wrecked, and the firm became bankrupt. Since that disaster the bat skulks about till midnight to avoid his creditors, the cormorant is for ever diving into the deep to discover its foundered vessel, while the bramble seizes hold of every passing sheep to make up his loss by stealing the wool.

Returning to the rose, we may quote one or two legendary stories relating to its origin. Thus Sir John Mandeville tells us how when a holy maiden of Bethlehem, “blamed with wrong and slandered,” was doomed to death by fire, “she made her prayers to our Lord that He would help her, as she was not guilty of that sin;” whereupon the fire was suddenly quenched, and the burning brands became red “roses,” and the brands that were not kindled became white “roses” full of roses. “And these were the first roses and roses, both white and red, that ever any man sought.” Henceforth, says Mr. King, ^[3] the rose became the flower of martyrs. “It was a basket full of roses that the martyr Saint Dorothea sent to the notary of Theophilus from the garden of Paradise; and roses, says the romance, sprang up all over the field of Ronce-vaux, where Roland and the douze pairs had stained the soil with their blood.”

The colour of the rose has been explained by various legends, the Turks attributing its red colour to the blood of Mohammed. Herrick, referring to one of the old classic stories of its divine origin, writes:—

“Tis said, as Cupid danced among the gods, he down the nectar flung, Which, on the white rose being shed, made it for ever after red.”

A pretty origin has been assigned to the moss-rose (*Rosa muscosa*):— “The angel who takes care of flowers, and sprinkles upon them the dew in the still night, slumbered on a spring day in the shade of a rosebush, and when she awoke she said, 'Most beautiful of my children, I thank thee for thy refreshing odour and cooling

shade; could you now ask any favour, how willingly would I grant it!' 'Adorn me then with a new charm,' said the spirit of the rose-bush; and the angel adorned the loveliest of flowers with the simple moss."

A further Roumanian legend gives another poetic account of the rose's origin. "It is early morning, and a young princess comes down into her garden to bathe in the silver waves of the sea. The transparent whiteness of her complexion is seen through the slight veil which covers it, and shines through the blue waves like the morning star in the azure sky. She springs into the sea, and mingles with the silvery rays of the sun, which sparkle on the dimples of the laughing waves. The sun stands still to gaze upon her; he covers her with kisses, and forgets his duty. Once, twice, thrice has the night advanced to take her sceptre and reign over the world; twice had she found the sun upon her way.

Since that day the lord of the universe has changed the princess into a rose; and this is why the rose always hangs her head and blushes when the sun gazes on her." There are a variety of rose-legends of this kind in different countries, the universal popularity of this favourite blossom having from the earliest times made it justly in repute; and according to the Hindoo mythologists, Pagoda Sin, one of the wives of Vishnu, was discovered in a rose—a not inappropriate locality.

Like the rose, many plants have been extensively associated with sacred legendary lore, a circumstance which frequently explains their origin. A pretty legend, for instance, tells us how an angel was sent to console Eve when mourning over the barren earth.

Now, no flower grew in Eden, and the driving snow kept falling to form a pall for earth's untimely funeral after the fall of man. But as the angel spoke, he caught a flake of falling snow, breathed on it, and bade it take a form, and bud and blow. Ere it reached the ground it had turned into a beautiful flower, which Eve prized more than all the other fair plants in Paradise; for the angel said to her:—

"This is an earnest, Eve, to thee,
That sun and summer soon shall be."

The angel's mission ended, he departed, but where he had stood a ring of snowdrops formed a lovely posy.

This legend reminds us of one told by the poet Shiraz, respecting the origin of the forget-me-not:—"It was in the golden morning of the early world, when an angel sat weeping outside the closed gates of Eden. He had fallen from his high estate through loving a daughter of earth, nor was he permitted to enter again until she whom he loved had planted the flowers of the forget-me-not in every corner of the world. He returned to earth and assisted her, and they went hand in hand over the world planting the forget-me-not. When their task was ended, they entered Paradise together; for the fair woman, without tasting the bitterness of death, became immortal like the angel, whose love her beauty had won, when she sat by the river twining the forget-me-not in her hair." This is a more poetic legend than the familiar one given in Mill's "History of Chivalry," which tells how the lover, when trying to pick some blossoms of the myosotis for his lady-love, was drowned, his last words as he threw the flowers on the bank being "Forget me not." Another legend, already noticed, would associate it with the magic spring-wort, which revealed treasure-caves hidden in the mountains. The traveller enters such an opening, but after filling his pockets with gold, pays no heed to the fairy's voice, "Forget not the best," *i.e.*, the spring-wort, and is severed in twain by the mountain clashing together.

In speaking of the various beliefs relative to plant life in a previous chapter, we have enumerated some of the legends which would trace the origin of many plants to the shedding of human blood, a belief which is a distinct survival of a very primitive form of belief, and enters very largely into the stories told in classical mythology. The dwarf elder is said to grow where blood has been shed, and it is nicknamed in Wales "Plant of the blood of man," with which may be compared its English name of "death-wort." It is much associated in this country with the Danes, and tradition says that wherever their blood was shed in battle, this plant afterwards sprang up; hence its names of Dane-wort, Dane-weed, or Dane's-blood. One of the bell-flower tribe, the clustered bell-flower, has a similar legend attached to it; and according to Miss Pratt, "in the village of Bartlow there are four remarkable hills, supposed to have been thrown up by the Danes as monumental memorials of the battle fought in 1006 between Canute and Edmund Ironside. Some years ago the clustered bell-flower was largely scattered about

these mounds, the presence of which the cottagers attributed to its having sprung from the Dane's blood," under which name the flower was known in the neighbourhood.

The rose-coloured lotus or melilot is, from the legend, said to have been sprung from the blood of a lion slain by the Emperor Adrian; and, in short, folk-lore is rich in stories of this kind. Some legends are of a more romantic kind, as that which explains the origin of the wallflower, known in Palestine as the "blood-drops of Christ." In bygone days a castle stood near the river Tweed, in which a fair maiden was kept prisoner, having plighted her troth and given her affection to a young heir of a hostile clan. But blood having been shed between the chiefs on either side, the deadly hatred thus engendered forbade all thoughts of a union. The lover tried various stratagems to obtain his fair one, and at last succeeded in gaining admission attired as a wandering troubadour, and eventually arranged that she should effect her escape, while he awaited her arrival with an armed force. But this plan, as told by Herrick, was unsuccessful:—

"Up she got upon a wall,
Attempted down to slide withal;
But the silken twist untied,
She fell, and, bruised, she died.
Love, in pity to the deed,
And her loving luckless speed,
Twined her to this plant we call
Now the 'flower of the wall.'"

The tea-tree in China, from its marked effect on the human constitution, has long been an agent of superstition, and been associated with the following legend, quoted by Schleiden. It seems that a devout and pious hermit having, much against his will, been overtaken by sleep in the course of his watchings and prayers, so that his eyelids had closed, tore them from his eyes and threw them on the ground in holy wrath. But his act did not escape the notice of a certain god, who caused a tea-shrub to spring out from them, the leaves of which exhibit, "the form of an eyelid bordered with lashes, and possess the gift of hindering sleep." Sir George Temple, in his "Excursions in the Mediterranean," mentions a legend relative to the origin of the geranium. It is said that the prophet Mohammed having one day washed his shirt, threw it upon a mallow plant to dry; but when it was afterwards taken away, its sacred contact with the mallow was found to have changed the plant into a fine geranium, which now for the first time came into existence.

Footnotes:

1. "Plant-Lore Legends and Lyrics."
2. Folkard's "Plant Lore Legends and Lyrics," p. 430.
3. "Sacred Trees and Flowers," *Quarterly Review*, cxiv. 239.

CHAPTER XXIII. MYSTIC PLANTS.

The mystic character and history of certain plants meet us in every age and country. The gradual evolution of these curious plants of belief must, no doubt, partly be ascribed to their mythical origin, and in many cases to their sacred associations; while, in some instances, it is not surprising that, "any plant which produced a marked effect upon the human constitution should become an object of superstition." ^[1] A further reason why sundry plants acquired a mystic notoriety was their peculiar manner of growth, which, through not being understood by early botanists, caused them to be invested with mystery. Hence a variety of combinations have produced those mystic properties of trees and flowers which have inspired them with such superstitious veneration in our own and other countries. According to Mr. Conway, the apple, of all fruits, seems to have had the widest and most mystical history. Thus, "Aphrodite bears it in her hand as well as Eve; the serpent guards it, the dragon watches it. It is the healing fruit of the Arabian tribes. Azrael, the Angel of Death, accomplishes his mission by holding it to the nostrils, and in the prose Edda it is written, 'Iduna keeps in a box apples which the gods, when they feel

old age approaching, have only to taste to become young again.” Indeed, the legendary mythical lore connected with the apple is most extensive, a circumstance which fully explains its mystic character. Further, as Mr.

Folkard points out,^[2] in the popular tales of all countries the apple is represented as the principal magical fruit, in support of which he gives several interesting illustrations. Thus, “In the German folk-tale of 'The Man of Iron,' a princess throws a golden apple as a prize, which the hero catches three times, and carries off and wins.” And in a French tale, “A singing apple is one of the marvels which Princess Belle-Etoile and her brothers and her cousin bring from the end of the world.” The apple figures in many an Italian tale, and holds a prominent place in the Hungarian story of the Iron Ladislas.^[3] But many of these so-called mystic trees and plants have been mentioned in the preceding pages in their association with lightning, witchcraft, demonology, and other branches of folk-lore, although numerous other curious instances are worthy of notice, some of which are collected together in the present chapter. Thus the nettle and milfoil, when carried about the person, were believed to drive away fear, and were, on this account, frequently worn in time of danger. The laurel preserved from misfortune, and in olden times we are told how the superstitious man, to be free from every chance of ill-luck, was wont to carry a bay leaf in his mouth from morning till night.

One of the remarkable virtues of the fruit of the balm was its prolonging the lives of those who partook of it to four or five hundred years, and Albertus Magnus, summing up the mystic qualities of the heliotrope, gives this piece of advice:—“Gather it in August, wrap it in a bay leaf with a wolf's tooth, and it will, if placed under the pillow, show a man who has been robbed where are his goods, and who has taken them. Also, if placed in a church, it will keep fixed in their places all the women present who have broken their marriage vow.” It was formerly supposed that the cucumber had the power of killing by its great coldness, and the larch was considered impenetrable by fire; Evelyn describing it as “a goodly tree, which is of so strange a composition that 'twill hardly burn.”

In addition to guarding the homestead from ill, the hellebore was regarded as a wonderful antidote against madness, and as such is spoken of by Burton, who introduces it among the emblems of his frontispiece, in his “Anatomie of Melancholy:”—

“Borage and hellebore fill two scenes,
Sovereign plants to purge the veins
Of melancholy, and cheer the heart
Of those black fumes which make it smart;
To clear the brain of misty fogs,
Which dull our senses and Soul clogs;
The best medicine that e'er God made
For this malady, if well assay'd.”

But, as it has been observed, our forefathers, in strewing their floors with this plant, were introducing a real evil into their houses, instead of an imaginary one, the perfume having been considered highly pernicious to health.

In the many curious tales related of the mystic henbane may be quoted one noticed by Gerarde, who says: “The root boiled with vinegar, and the same holden hot in the mouth, easeth the pain of the teeth. The seed is used by mountebank tooth-drawers, which run about the country, to cause worms to come forth of the teeth, by burning it in a chafing-dish of coles, the party holding his mouth over the fume thereof; but some crafty companions, to gain money, convey small lute-strings into the water, persuading the patient that those small creepers came out of his mouth or other parts which he intended to cure.” Shakespeare, it may be remembered, alludes to this superstition in “Much Ado About Nothing” (Act iii. sc. 2), where Leonato reproaches Don Pedro for sighing for the toothache, which he adds “is but a tumour or a worm.” The notion is still current in Germany, where the following incantation is employed:—

“Pear tree, I complain to thee
Three worms sting me.”

The henbane, too, according to a German belief, is said to attract rain, and in olden times was thought to produce sterility. Some critics have suggested that it is the plant referred to in “Macbeth” by Banquo (Act i. sc. 3):—

“Have we eaten of the insane root
That takes the reason prisoner?”

Although others think it is the hemlock. Anyhow, the henbane has long been in repute as a plant possessed of mysterious attributes, and Douce quotes the subjoined passage:—“Henbane, called *insana*, mad, for the use thereof is perillous, for if it be eate or dronke, it breedeth madness, or slowe lykeness of sleepe.” In days gone by, when the mandrake was an object of superstitious veneration by reason of its supernatural character, the Germans made little idols of its root, which were consulted as oracles. Indeed, so much credence was attached to these images, that they were manufactured in very large quantities for exportation to various other countries, and realised good prices. Oftentimes substituted for the mandrake was the briony, which designing people sold at a good profit. Gerarde informs us, “How the idle drones, that have little or nothing to do but eat and drink, have bestowed some of their time in carving the roots of briony, forming them to the shape of men and women, which falsifying practice hath confirmed the error amongst the simple and unlearned people, who have taken them upon their report to be the true mandrakes.” Oftentimes, too, the root of the briony was trained to grow into certain eccentric shapes, which were used as charms. Speaking of the mandrake, we may note that in France it was regarded as a species of elf, and nicknamed *main de gloire*; in connection with which Saint-Palaye describes a curious superstition:— “When I asked a peasant one day why he was gathering mistletoe, he told me that at the foot of the oaks on which the mistletoe grew he had a mandrake; that this mandrake had lived in the earth from whence the mistletoe sprang; that he was a kind of mole; that he who found him was obliged to give him food—bread, meat, and some other nourishment; and that he who had once given him food was obliged to give it every day, and in the same quantity, without which the mandrake would assuredly cause the forgetful one to die. Two of his countrymen, whom he named to me, had, he said, lost their lives; but, as a recompense, this *main de gloire* returned on the morrow double what he had received the previous day. If one paid cash for the *main de gloire's* food one day, he would find double the amount the following, and so with anything else. A certain countryman, whom he mentioned as still living, and who had become very rich, was believed to have owed his wealth to the fact that he had found one of these *mains de gloire*.” Many other equally curious stories are told of the mandrake, a plant which, for its mystic qualities, has perhaps been unsurpassed; and it is no wonder that it was a dread object of superstitious fear, for Moore, speaking of its appearance, says:—

“Such rank and deadly lustre dwells,
As in those hellish fires that light
The mandrake's charnel leaves at night.”

But these mandrake fables are mostly of foreign extraction and of very ancient date. Dr. Daubeney, in his “Roman Husbandry,” has given a curious drawing from the Vienna MS. of Dioscorides in the fifth century, representing the Goddess of Discovery presenting to Dioscorides the root of the mandrake (of thoroughly human shape), which she has just pulled up, while the unfortunate dog which had been employed for that purpose is depicted in the agonies of death.

Basil, writes Lord Bacon in his “Natural History,” if exposed too much to the sun, changes into wild thyme; and a Bavarian piece of folk-lore tells us that the person who, during an eclipse of the sun, throws an offering of palm with crumbs on the fire, will never be harmed by the sun. In Hesse, it is affirmed that with knots tied in willow one may slay a distant enemy; and according to a belief current in Iceland, the *Caltha palustris*, if taken with certain ceremonies and carried about, will prevent the bearer from having an angry word spoken to him. The virtues of the dittany were famous as far back as Plutarch's time, and Gerarde speaks of its marvellous efficacy in drawing forth splinters of wood, &c., and in the healing of wounds, especially those “made with envenomed weapons, arrows shot out of guns, and such like.”

Then there is the old tradition to the effect that if boughs of oak be put into the earth, they will bring forth wild vines; and among the supernatural qualities of the holly recorded by Pliny, we are told that its flowers cause water to freeze, that it repels lightning, and that if a staff of its wood be thrown at any animal, even if it fall short of touching it, the animal will be so subdued by its influence as to return and lie down by it. Speaking, too, of the

virtues of the peony, he thus writes:—"It hath been long received, and confirmed by divers trials, that the root of the male peony dried, tied to the necke, doth helpe the falling sickness, and likewise the incubus, which we call the mare. The cause of both these diseases, and especially of the epilepsie from the stomach, is the grossness of the vapours, which rise and enter into the cells of the brain, and therefore the working is by extreme and subtle alternation which that simple hath." Worn as an amulet, the peony was a popular preservative against enchantment.

Footnotes:

1. *Fraser's Magazine* 1870, p. 709.
 2. "Plant Lore Legends and Lyrics," p. 224.
 3. See Miss Busk's "Folk-lore of Rome."
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Tapping Our Heritage of Ethnobotanical Lore¹

RICHARD EVANS SCHULTES²

The Space Age is upon mankind. It beckons to incredibly strange and promising areas of new discovery. It is wonderful to be alive at such a time and to dream about what may be ahead in learning. Some of us hope, however, that space study will not lessen the attention given to the many fields anchored on this small globe. One of the many fields of this kind is investigation of the Plant Kingdom as it relates to the liberation of man from pain and sickness.

How are we to proceed in furthering our understanding of this phase of the plant sciences? There are three main methods which may be followed: one is basically bibliographic; two are concerned primarily with field work. Both the bibliographic and the field methods may sometimes of necessity or advantageously be interwoven. These three paths of research are: 1) a survey of the literature for reports of therapeutic uses of or beliefs about plants; 2) the chemical investigation of definite floras or of chosen families or genera of plants in the search for new active principles; 3) the field study of ethnobotany amongst primitive peoples.

Primitive man everywhere lived close to nature. An important—yes, an essential—part of his equipment was a deep and discerning acquaintance with the flora around him. This acquaintance led inevitably to experimentation. From the experimentation there gradually accrued a knowledge of properties, useful and harmful, of many plants. And this knowledge,

tested by time, grew into an integral part of culture and was passed on from generation to generation. Some of it is still with us to-day. It may not, however, be here long.

Civilization is on the advance in many, if not most, primitive regions. It has long been on the advance, but its pace is now accelerated as the result of world wars, extended commercial interests, increased missionary activity, widened tourism. The feverish road-building in Latin America gives us an example of how fast penetration is proceeding. The fact that what our political leaders euphemistically call “progress” is often synonymous with destruction of natural resources is beside the point here. What does concern us is the progressive divorcement of primitive peoples to a greater or lesser degree from dependence upon their immediate environment. The arrival and cheap availability of the aspirin pill, for example, seems often to start an astonishing disintegration of native medical lore. The rapidity of this disintegration is frightening—I doubt that even the field anthropologist is fully aware of its pace. That the aspirin may be more beneficial than herbs and magic is not ours to consider here. What does interest us academically and practically is how to salvage some of the medico-botanical lore before it shall have been forever entombed with the culture that gave it birth.

ETHNOBOTANY—the study of plants as they relate to human affairs, especially amongst primitive peoples—is not new. The world’s literature from earliest written records is replete with references to useful or harmful plants, especially those endowed with supposedly curative powers. And some cultures, such as the Peru-

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vian, which had not invented writing, have left us a rich heritage of archaeological material from which much may be gleaned. The Sumerian ideograms, dating back to 4000 B.C., refer to plant uses. The Ebers Papyrus, written in Egypt about 1500 B.C., is a rich ethnobotanical manuscript. The oldest Chinese source seems to be Erh-ya, a book on nature studies, written in 3000 B.C.; other ancient Chinese sources are the Book of Poems, the *Svu-ching*, of 1000 B.C. and the Ben-tsao, an early herbal, dating from 1250 A.D. In India, the sacred Vedas (1500-1000 B.C.) give us many references to plant uses. The classical world of the Mediterranean, set in a not-too-rich flora, made extensive use of the Plant Kingdom in alleviating and presumably curing human ills. The medico-botanical lore of the cultures of Asia Minor, Greece and Rome, including that of the Biblical peoples, is too well known to detail here. As a result of the studies to interpret Dioscorides and other classical writers which occupied the attention of European doctors and botanists until about 1600, probably little of an ethnobotanical nature written by the Greeks escaped the attention of the Europeans of the Middle Ages.

The discovery of the New World led to more than extension of geographic knowledge. Reports of the plants of the new lands and their curious uses helped free herbalists from slavish repetition of the classical writers. The 16th and 17th Centuries are especially rich in writings with references to New World plants, ranging from incidental but sometimes highly significant references in reports of travellers, missionaries or explorers to extensive volumes by specialists on natural history. These are too numerous to enumerate. The conquest of Mexico, for example, gives us outstanding examples of this kind of literature. Some of the most valuable references to Aztec medicinal plants appear in the writings of the cleric Sahagún, whose pen covered a vast ex-

panse to create the work called "*Historia General de las Cosas de Nueva España*." These old clerics had an orderly method which allowed them to cover, even though with extreme prejudice, an astounding range of topics. Many similar works, though few so extensive, came out of Mexico of the post-conquest years, and these have not yet really been adequately studied. There is little, however, which can compare in thoroughness, accuracy and detachment to the "*Nova Plantarum, Animalium et Mineralium Mexicanorum Historia*," written between 1570 and 1575 by Dr. Francisco Hernández, physician to the King of Spain. Accurate though stylized drawings of plants are accompanied by extremely detailed accounts of the plants and their uses. There is a wealth of information here which still bears investigation. In addition to the old writings that did see publication, there are manuscripts which, because they have never been printed, are even more worthy of investigative study.

How important it is that one of our starting points in studying medico-botanical lore lies in a critical examination of this published and unpublished emporium may be illustrated by two recent advances in Mexican ethnobotany. These advances, had the reports of the old chroniclers been taken seriously by modern investigators, would not have been recent.

Time has frequently erased, through extinction or absorption, the cultures and peoples on which old reports were based. This is, however, not always the case. In a few fortuitous instances, descendants still live in the same region and are culturally little changed. If the peoples and cultures are gone, then, of course, no amount of field work today can uncover corroboration of old records of plant uses. On the other hand, if the peoples and cultures be still available for study, then careful field investigation may uncover similar uses persisting into the present, and we may oftentimes learn much more

by modern studies than the old chroniclers were able to write down for posterity. This is borne out in our experience in Mexican ethnobotanical studies, and especially in two cases which we shall consider now.

Sahagún and other non-technical writers reported the use as a sacred hallucinogen of a lentil-like seed borne on a climber and called *ololiuqui* amongst the Aztecs. One edition of Sahagún's writings pictures a twiner with a swollen root. Most of the chroniclers were men of the church and they railed violently against this "diabolic seed" valued by the pagan Indian as a divine messenger capable of taking man's mind to spirit realms. In his more technical manner, Hernández described *ololiuqui* in detail, pointing out its therapeutic and psychotomimetic use and giving us a drawing which unmistakably puts *ololiuqui* into the Convolvulaceae, the family of the morning glory. Notwithstanding the insistence of several Mexican botanists in the past century that *ololiuqui* was, in fact, referable to the convolvulaceous *Rivea corymbosa*, no corroboration came from field work. In 1915, the American economic botanist Safford categorically stated that *ololiuqui* could not be referred to the Convolvulaceae but that it must represent *Datura meteloides*, a well known narcotic employed in Mexico and the American Southwest as an hallucinogen. Safford argued that no narcotic member of the Convolvulaceae was known; that the intoxication induced by *ololiuqui* was similar to that induced by *Datura*; and that the convolvulaceous flower, trumpet-shaped, might pass superficially for a flower of *Datura*. Safford went so far as to doubt the value of certain early Mexican accounts of ethnobotany when he stated: "A knowledge of botany has been attributed to the Aztecs which they were far from possessing. . . . The botanical knowledge of the early Spanish writers, Sahagún, Hernández, Ortega and Jacinto

de la Serna, was perhaps not much more extensive: their descriptions were so inadequate that even to the present day the chief narcotic of the Aztecs, *ololiuqui*, which they all mention, remains unidentified."

It was not until the early 1940's that, on the basis of specimens of *Rivea corymbosa* which I discovered growing in the dooryard of a curandero in northeastern Oaxaca, modern field work vindicated the accuracy of the observations of the early Spanish chroniclers. So far as I know, chemical examination of *Rivea corymbosa* has not yet uncovered the active principle, but work is still being continued, and the results may turn out to be of a more far-reaching nature than we might normally expect.

I would also cite here the interesting case of the sacred psychotomimetic mushrooms of Mexico. As with *ololiuqui*, the early chroniclers spoke of their use in religious rites as a kind of sacrament inducing visual hallucinations. Called *teonanacatl* or "flesh of the gods," these fungi drew special wrath and persecution from ecclesiastical authorities. Half a dozen chroniclers mentioned them. One of these, Sahagún, has unusually detailed descriptions of the intoxication; and one of his writings published crude illustrations of the narcotic mushrooms. Hernández wrote of three kinds which the natives worshipped.

Notwithstanding the relatively numerous and forceful Spanish reports, nothing was known of the identity of the mushrooms until recently. Persecution drove the mushroom cult into hiding. The first attempt to identify *teonanacatl* was made in 1915 when Safford asserted that it was really the peyote cactus. The dried, brown, discoidal head or "button" of *Lophophora Williamsii*, he wrote rather unconvincingly, resembled "a dried mushroom so remarkably that at first glance it will even deceive a mycologist." As with *ololiuqui*, Safford's outstanding reputation stamped

his views with authority and, despite the denials of Reko, a physician and amateur botanist of Mexico, his conclusions were widely accepted.

It was not until the 1930's that the first steps towards identification came. Weitlaner, an engineer of Mexico City, collected specimens in Oaxaca; though poorly preserved, these were identified at Harvard as representing the mushroom genus *Panaeolus*. The next year, Reko and I found *Panaeolus sphinctrinus* and *Stropharia cubensis* employed by the Mazatecs of Oaxaca, and I published a note on the first of these as apparently the major hallucinogenic mushroom of the region. My work then took me to the Amazon for twelve years, and I never returned to Oaxaca to follow up the research. Perhaps this was providential. Fifteen years later, Mr. R. Gordon Wasson and his wife, keen amateur mycologists, read my papers and began a series of meticulously planned expeditions to Oaxaca. He sensed the need for an intensive, all-inclusive study of the sacred mushrooms and their uses, so he enlisted the collaboration of specialists. The resulting research, woven by Wasson into an intricately interrelated whole, will long hold a high place as an outstanding model of what concerted and thoroughly executed ethnobotanical investigations can accomplish. The Wasson group, including the French mycologist, Heim and the Swiss chemist, Hofmann, has established the use as hallucinogens of seven species and varieties of mushrooms belonging to the genera *Conocybe*, *Psilocybe* and *Stropharia*. Their studies covered botany, ethnology, archaeology, linguistics, musicology, religion and chemistry. The chemical studies have established the presence in *Psilocybe* of an active principle, psilocybine, an acidic phosphoric acid ester of 4-hydroxydimethyltryptamine, allied to such compounds as bufotenine and serotone; and the first known naturally-occurring indole derivative containing phosphorus. The

work on these mushrooms has opened up long vistas in many fields of research.

The important consideration for us at this point, however, is the timing of research into ololiuqui and teonanacatl. With the rapidity of penetration and acculturation in Mexico, it is certain that we have arrived in the nick of time. I am convinced that another quarter of a century might have doomed to extinction much if not all of the ethnobotanical lore surrounding the sacred mushrooms in many if not all of the mountain areas where it still flourishes. It has lain available to us for 400 years had we but taken seriously the early reports. How fortuitous our arrival! Will it be as fortuitous with other perhaps equally fascinating and rewarding medicobotanical lore? Few of us could have been ready to accept the fantastic reports of the early writers on the unearthly effects of the sacred mushrooms. Now we know how true they were. We can no longer afford to prejudge reports of aboriginal uses of plants simply because they seem to fall beyond our limit of credence.

Notwithstanding the fact that primitive peoples do possess a valuable understanding of the properties of plants, we realize that their knowledge has been optimistically exaggerated in the past and that it must be far from complete. We could not expect it to be otherwise. It, therefore, behooves us to carry out our own phytochemical studies of the flora in general. This study is probably best done along two paths: 1) intensive examination of families and genera known to be rich in active principles—alkaloids, glucosides, resins, etc.; and 2) a systematic examination, species by species, of a random sampling of floras.

Much has been done in the study of groups rich in active principles. It is not of recent inception, but it has been greatly intensified in recent years. This intensification of research has been directed especially towards alkaloidal groups, partly

because of improved phytochemical techniques. An excellent summary, published recently by Willaman and Schubert, stresses the important advances made and points out the promise that future investigation holds. They tabulate the presence or absence of alkaloids in 250 families, stating that "about 950 alkaloids have been isolated and named from two percent of all species which have been tested for them." Similar efforts with glucosides and other principles might be equally rewarding.

The phytochemical study of every species represented in a restricted geographic area or vegetational zone would seem likewise to be a basically sound approach. It requires, however, a somewhat more concerted botanical attack and must be backed up with very extensive chemical and pharmacological laboratory facilities. A few attempts along this line of attack have been sporadically carried out. Such a survey of the flora of Queensland for alkaloids has been under way since the 1940's by Australian scientists. Similar, though more conservative, alkaloidal surveys of floras are reported for North Borneo and the Argentine. I am aware of at least one American drug company now active in this kind of research with a survey of flora of Pennsylvania and about to undertake a study of plants collected in the rich flora of Colombia in South America. The results from this type of investigation are certain to be full of surprises, such as the recent discovery in the silver maple, *Acer saccharum*, of an indole alkaloid: gramine. It may be a long while before the pieces in such a puzzle fall into place, but the method is indeed a challenging one.

Perhaps the most satisfying way of studying ethnobotany is direct investigation amongst primitive peoples. Insofar as this method is time-consuming, it is not easy, but it cannot be called difficult or hazardous. Only in the sensational books written for self-glorification by intrepid

"explorer-writers" do these difficulties and hazards assume a gargantuan status. The generalized idea of the explorer is wrong. His is a job much like the bank teller's. The anthropologist or botanist willing to work and travel for long periods, or the missionary living permanently amongst natives, has unparalleled opportunities for learning something of the plant medicines of the region. And of these, perhaps, the botanist has the easiest entrée. Most natives become intensely curious at the botanist's ceaseless plant collecting. This curiosity creates a rapport between botanist and native, a common denominator leading to an easier exchange of conversation and ideas concerning plant uses.

I can, of course, speak only of the American tropics, but I do believe that similar conditions prevail elsewhere. The rather prevalent concept that witch-doctors have secrets which they guard zealously is in general unfounded. This impression results probably from the natural reticence of many natives in the presence of civilized man whom they feel to be superior. In connection with their medical practices, they may have experienced that white man's patronizing or even deprecating brush-off; and this is hardly conducive to openness in discussion. Much can be accomplished if the ethnobotanical investigator treats natives as a gentleman should. He must realize that, far from being the superior individual, he—the civilized man—is in many respects far inferior to the native in the native's own environment. In my twelve years of almost permanent residence and exploration in the northwest Amazon, I never found natives unduly reticent or resentful of any interest which I expressed in their medicinal or narcotic plants. I discovered that the farther I moved from small towns and mission stations, the more openly did the Indian discuss these matters. It went even farther than frank discussion: I very often partook of native

narcotics along with Indians in their rituals and dances and was frequently able to witness the treatment of disease by a witch doctor and to discuss it with the practitioner. The example of oral contraceptives in a case in point. Far from white man's influence, the native will discuss and point out the plants used as oral contraceptives; but within the sphere of missionary influence or commercial centres, it is absolutely impossible to discuss the question, although I strongly suspect that many of the civilized or acculturated natives know and use the plants.

It would be far beyond the scope of this short talk to consider methods of carrying out field work in ethnobotany. They vary with the region; with the kind of people and their degree of acculturation; with the wealth of the flora and our understanding of it; with the time available for the study; with the size of the investigating group; with the type and extent of training of the principal investigator.

There is one all-important condition which all good field work should demand; voucher specimens for the identification of every plant for which an important use is reported. The field of native drug plants, especially, is an example of this basic need. Much of the excellent chemical work done on various native medicinal plants during the past sixty years is value-

less to-day because it cannot be repeated. No voucher herbarium specimens backed up the botanical determination of the material under analysis. In fact, the so-called "determination" was made often not by a botanist but by a chemist or even by an office executive, from a vernacular name.

There remains to say a word about the best preparation for ethnobotanical research. Outstanding contributions can be and have been made by men of various degrees of preparation in sundry fields. The anthropologist—if he pay heed to the botanical necessities of this research—may be admirably trained. I should say that the ideal training, however, would be basically botanical with ample backgrounds in ethnology and ethnography on the one hand, and in plant chemistry and pharmacology or medicine on the other. A facility in learning languages would likewise be helpful. Such a combination cannot frequently be found, and few universities now apparently look with favour on such an interdisciplinary training. But when a scientist with this or similar preparation does appear, we would be negligent if we did not make every effort to channel his research energies into the general field of study of the interrelationship between man and his plant environment.



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De Plantis Toxicariis e Mundo Novo Tropicale Commentationes XXXVI. Justicia (Acanthaceae)
as a Source of an Hallucinogenic Snuff

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De Plantis Toxicariis e Mundo Novo Tropicale Commentationes XXXVI. *Justicia* (Acanthaceae) as a Source of an Hallucinogenic Snuff¹

RICHARD EVANS SCHULTES²

The history of use, botanical identification, and known chemical constituents of Justicia pectoralis (Acanthaceae), one of the South American hallucinogens, are reviewed.

Justicia (Acanthaceae) como fonte de rapé halucinogênico. A história do uso, identificação botânica, e constituintes químicos conhecidos de Justicia pectoralis (Acanthaceae), uma das plantas halucinógenas sul-americanas, são revistos.

There has long been uncertainty concerning the role played by leaves of the genus *Justicia* in South American hallucinatory preparations—whether merely as additives to snuff-powder made basically from *Virola theiodora* or alone as the source of a psychoactive snuff.

Perhaps the first reference to *Justicia* based on identifiable botanical material as having a role in psychotropic snuffs in South America was published in 1967 (Schultes 1967).

There are numerous references in the literature to the small, herbaceous plant known to the Waikas as *masha-hiri* or a close variant of this name. All the earliest references cited no botanical collections.

What appears to be the first report is that of Barker (1953), a missionary amongst the Venezuelan Waikas, who stated that these Indians had various kinds of *yopo* of different strengths prepared from leaves, bark, and ashes of a bark; the reference to “leaves” may concern *Justicia*, but there is no certainty.

The ethnologist Zerries (1960) indicated that an herbaceous plant was added to the *epena* snuff. The anthropologist Becher (1960) wrote that the Surará and Pakidái, Waika groups in northwestern Brazil, added a cultivated member of the pepper family (Piperaceae) called *maxaraha* to *Virola*-snuff; this “identification” is probably the first attempt at a botanical determination, even though it was not based on specimens of the plant. Seitz (1965, 1967) reported that, in a Waika settlement on the Rio Maturacá in Brazil, “we saw that a third ingredient was added to the preparation of *Virola*-snuff with the ashes of *ama-asita*—later identified as *Elizabetha princeps* [Schultes and Holmstedt 1968]—the little leaves of an herbaceous plant called *mashi-hiri*, like the *epena* scrapings and powdered. These leaves, however, have no intoxicating effect. The Indians say they are merely aromatic.”

Wilbert (1963) stated that the Karimé, culturally and geographically related to the Waikas of the Orinoquia of Venezuela, are said to prepare a snuff from “a small plant called *kokoime*.”

¹ Received 22 August 1987; accepted 27 December 1988.

² Botanical Museum of Harvard University, 26 Oxford Street, Cambridge, MA.

In his extensive and detailed studies of the Waika, Zerries (1960, 1964) did not mention any plant that might be *Justicia*, but he did note Salathé's description of an unidentified plant of weak growth, called by the Karimé Indians *kokoime*; it is, he reported, "without a stem" and occurs in cultivated plots; the leaves are dried and powdered and used as a narcotic (Salathé 1932). This plant could be a *Justicia*.

Wassén (1966) reported that the Indians of the upper Orinoco prepare their *yopo* from three plants: *hisioma* (*Anadenanthera peregrina*), *masho-hara* (said to be a piperaceous species), and *bolek-hena* (a powder called "leaves of the spirit of death").

In 1966, Biocca mentioned that *masci-hiri* is "an aromatic herbaceous plant" employed merely as an addition to the *Virola*-snuff amongst the Waikas.

Schultes (1967) reported the possible use of *Justicia* as an hallucinogen amongst Venezuelan Indians:

A number of years ago, a missionary working in the headwaters of the Orinoco in Venezuela handed me a partially rotted, matted roll of plant material which he said was the source of one of the narcotic snuffs of the Waika Indians. The condition of the material was very poor, but it seemed to represent a species of *Justicia*. This identification was tentatively corroborated by Dr. E. C. Leonard . . . I have never been able to visit this region to investigate the problem personally. With our unsatisfactory preservation of the material and the failure of other botanists who have visited the general region to report it . . . I more or less dismissed *Justicia* as a serious contender for inclusion in our list of hallucinogens. I am now, however, convinced that this problem must be investigated in the field, for recently, the Brazilian botanist, Prof. João Murça Pires, informed me personally that the Waikas do indeed employ a species of *Justicia*, a species close apparently to *Justicia pectoralis* [Fig. 1] in the preparation of a vision-producing snuff.

In 1968, Schultes and Holmstedt reported their ethnopharmacological study on the hallucinogens used in a Waika settlement (Wayhana-oo-thle) on the Rio Tototobí in the Territorio do Roraima, Brazil. They found these Waikas toasting the leaves of a *Justicia*, pulverizing them and adding the powder to the fine dust of the dried resin-like bark-exudate of *Virola theiodora*. These Indians know the plant as *masha-hara-hanak* (*hanak* meaning "leaf"); they also call the plant *boo-hanak*. They wrote that, when the natives dry and pulverize this dried exudate,

a powder of the leaves of a plant called *mashi-hiri* is prepared. This . . . herb, cultivated in dense patches near the edge of the village [Fig. 2], is the acanthaceous *Justicia pectoralis* var. *stenophylla* [Fig. 3]. It is kept hanging in bunches from the house-beams [Fig. 4] and is, consequently, usually quite dry when needed. The whole plant is crushed between the hands, the powder is sifted to remove bits of the stem and other refuse [Fig. 5], and the resulting fine greenish dust is added to an equal amount of the brown *Virola*-powder. The *Justicia* plant is pleasingly aromatic as it hangs drying, and the prepared powder is even more highly aromatic. The natives assert that it is added to improve the smell of the final *epena* snuff (*Virola*) and that it is not active. While it is true that other groups of Waika prepare a potent *Virola*-snuff without the *Justicia*, preliminary chemical investigation . . . suggests that we may be unwarranted in assuming that it is an ingredient wholly devoid of pharmacological activity."

These preliminary chemical analyses indicated such a very minor concentration of tryptamines that Schultes and Holmstedt felt that perhaps, since they had handled the material of *Justicia* without washing their hands following the handling of the heavily tryptamine-bearing *Virola* specimens, they unwittingly had contaminated the specimens of *Justicia*.

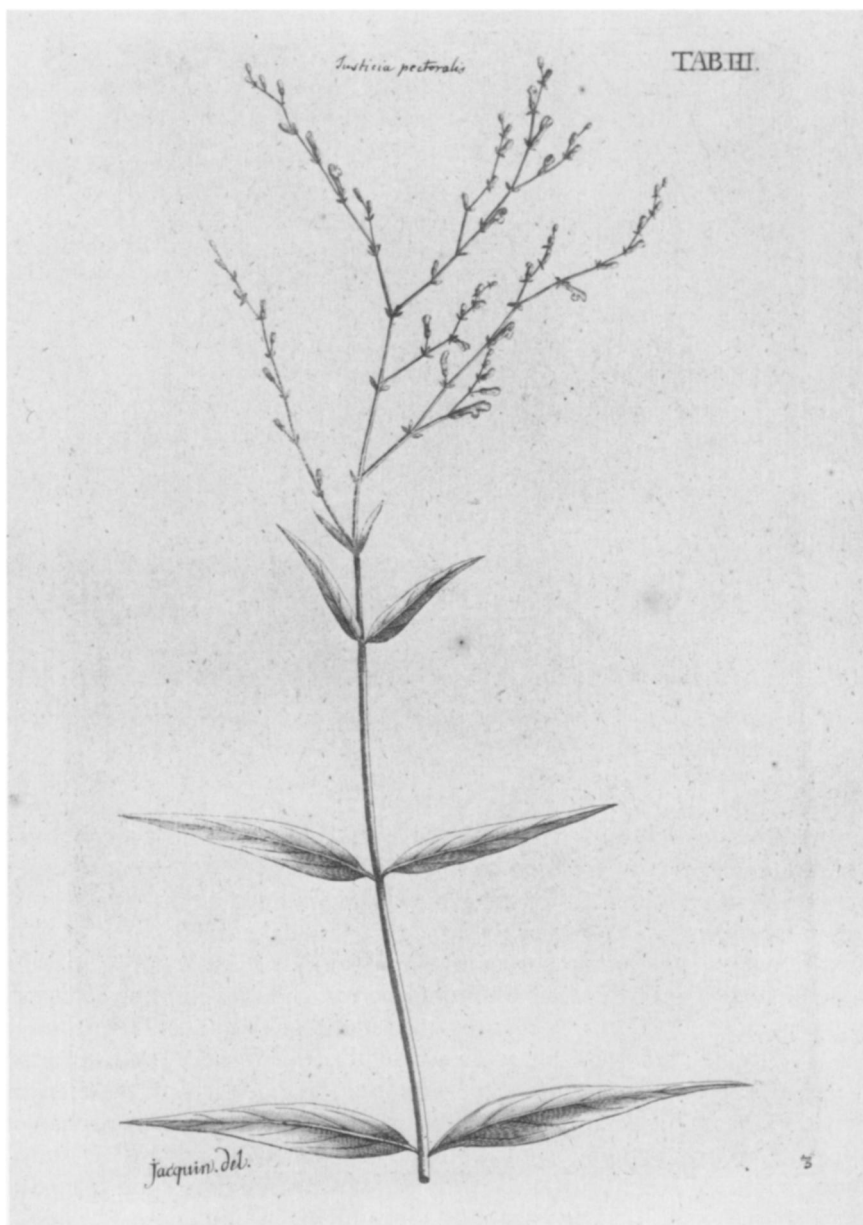


Fig. 1. *Justicia pectoralis*. Drawing published by Jacquin when he described the species.

This report apparently is the first that is based on identifiable botanical material and the earliest suggestion that tryptamines might be present in the species.

The American anthropologist Chagnon studied many Waika settlements in depth. In his book *Yanomamo, the Fierce People*, he did not mention *Justicia* in the first two editions (Chagnon 1968, 1977). In edition 3 of the book, however,



Fig. 2. Cultivation of *Justicia pectoralis* var. *stenophylla*. Waika Indian settlement of Majecototerí, Platanál, Venezuela. Photograph by B. Pflüger.

he reported, after mentioning *yakowana* (*Virola*) and *hisiomo* (*Anadenanthera*), that "several other plants are used to make hallucinogens: the Yanomamo cultivate a variety of small bushes of the genus *Justicia* and snuff these, but they are less potent and less desirable than the other two" (Chagnon 1983).

In two remarkably valuable papers by Chagnon, LeQuesne, and Cook (1970, 1971), dedicated to anthropological, botanical, and chemical findings concerning Waika hallucinogens, there was mention of a number of collections of different "types" of *Justicia* that were being grown at the Michigan Botanical Gardens under controlled conditions and were being identified at the Smithsonian Institution by a specialist on Acanthaceae, D. Wasshausen. Notes on the various Waika terms for the several hallucinogenic plants are given. It was definitely stated in these papers that *Justicia* is not merely an aromatic additive to snuff from *Virola* but that it is used by itself to prepare snuff for inducing intoxication. They pointed out that the term *ebene* refers to all hallucinogenic snuffs.

In connection with preparing this paper, I was interested in locating the voucher specimens of the numerous "types." Chagnon et al. (1971) had stated that "four of these specimens . . . were regarded as distinct entities by the present Yanomamo cultivators" and that two other *Justicia* specimens seemed to be different. "Pending confirmatory identification by Wasshausen, we tentatively classify all specimens (except the *sua-ka-henako* ["('leaves used on women') is used only as a magical aphrodisiac"] which has a distinct habit and leaf morphology and is best



Fig. 3. *Justicia pectoralis* var. *stenophylla*.

considered a distinct species) as different forms of *Justicia pectoralis* or possibly as different forms of *J. pectoralis* var. *stenophylla* . . .”

I made a search for the voucher specimens and found them in the possession of Dr. Wasshausen, who kindly gave them to the Economic Herbarium of Oakes Ames in the Botanical Museum of Harvard University. Several represent *J. pectoralis* and several have been identified as its variety *stenophylla*.

The phytochemist LeQuesne, in a letter to Holmstedt dated 1 Nov 1977, stated: “I also recall that you were interested in the constituents of *Justicia* species, which are also components of Yanomamo hallucinogenic preparations . . . We investi-

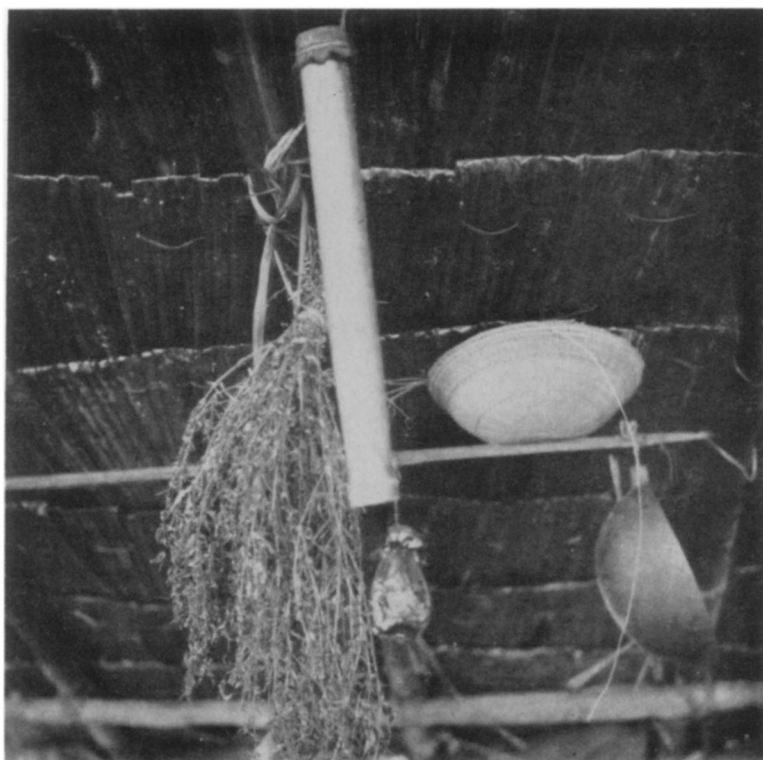


Fig. 4. *Justicia pectoralis* var. *stenophylla* hanging to dry, together with a bamboo tube of *Virola*-snuff and the woven basket used to sift the prepared snuff. Amongst the Waika Indians, Maturacá, Rio Cauaburi, Brazil. Photograph by R. E. Schultes.

gated some *J. pectoralis* grown in the University of Michigan Botanical Gardens, but apart from indications of the presence of small amounts of vasicine, we did not find anything." In another letter to Holmstedt, dated 5 Feb 1971, LeQuesne wrote: "Vasicine has been reported from related plants, but the main recent work I am aware of on *Justicia* species has been on piscicidal lignans. It seems possible, if the effect of the plants on the Yanomamo is really that of psychoactive drugs, that there could be non-nitrogenous psychoactive compounds present."

LeQuesne has recently informed me (pers. comm. 1987) that he found in the very scant material available trace amounts of tryptamines. This observation coincides with the results of Holmstedt's earlier finding of limited concentrations of tryptamines in *J. pectoralis* var. *stenophylla*. If indeed tryptamines be present in *Justicia* in small amounts, it might explain why the Waikas consistently state that *Justicia*-snuff is not so potent as that made from *Virola* or *Anadenanthera*.

The botanist Prance (1972) reported that in two of six Waika settlements visited in the Território do Roraima in northern Brazil, the leaves of *J. pectoralis* were frequently dried and added to *Virola*-based snuff apparently "for aromatic purposes rather than as an active ingredient." The vegetal material of *Virola* and *Justicia* analyzed by Holmstedt was found to have an active hallucinogenic ingredient only in the *Virola*.



Fig. 5. Waika Indians picking out stem material from *Justicia pectoralis* var. *stenophylla* prior to powdering the leaves for use in *Virola*-snuff. Rio Tototobí, Roraima, Brazil. Photograph by R. E. Schultes.

In 1976 and 1985, Lizot wrote: "To the usual substance—bark and seeds—they now add cultivated plants of the genus *Justicia*, which are psychedelic and aromatic."

Carias-Brewer and Steyermark (1976) reported that the Waika of the Río Cauaburi in Brazil used *J. pectoralis*—*mashi-hiri*—alone and as an admixture to the *Virola*-snuff. According to these investigators, "the leaves of this plant . . . can be used alone, but most of the time it serves rather to strengthen the more powerful *epena* [*Virola*] snuff powder." They further stated that the term *epena* referred to both snuffs—that made from *Virola* and that made from *Justicia*—and that it seemed to be a general term for intoxicating snuffs. Although they illustrated a dried specimen of *J. pectoralis* collected by other botanists in Venezuela, they failed to cite a voucher specimen for their undoubtedly correct identification of *mashi-hiri*.

The phytochemists Macrae and Towers (1984) published a detailed paper on their chemical study of *J. pectoralis*. The vouchered botanical material, collected in the Peruvian Amazonia, was propagated vegetatively in greenhouse conditions in Vancouver. Extracts of the propagated material contained no alkaloids but did contain widely occurring betaine; betaine, of course, is not known to be psychoactive. These investigators pointed out that, in mice, the extracts had no physiologically noticeable effect such as tryptamines would cause. They likewise found coumarine and umbelliferone, both widespread in plants, in the *Justicia*,

but the effects of the intoxicification induced, according to numerous observers, following the use of *Justicia*-snuff, could not be explained by these two constituents; they found, furthermore, that there were no synergistic effects due to extracts of *Justicia*. Their experiments have concluded that "the *J. pectoralis* extracts do not contain any constituent with a pharmacological activity . . . comparable to that of the tryptamine hallucinogens."

Coumarin is the constituent responsible for the aromatic fragrance of dried leaves of *J. pectoralis*, one of the reasons for its use as an admixture with the powder from the *Viola* exudate.

Macrae and Towers suggested, however, that "the contribution of these varied biological activities to the overall effect of the . . . snuff is not clear. The sedative and hypnotic activity observed for coumarin is interesting in this respect . . . The ability of scopoletin to reduce blood pressure . . . is also of interest. Tryptamine administration is often accompanied by transient increases in blood pressure . . . The possibility that coumarin or umbelliferone could lower blood pressure and thereby reduce one of the stressful aspects of the tryptamines is intriguing." But they concluded that they found no evidence "to support the belief that *Justicia pectoralis* is an hallucinogenic plant. Nor does it appear to directly affect the behavioural effects of 5-MeODMT."

Despite the failure to find hallucinogenic compounds in the snuff prepared from the leaves of *J. pectoralis*, there is now no doubt that an hallucinogenic snuff is prepared from these leaves with no other plant material; this fact is attested by numerous observations and reports by anthropologists and botanists who have been engaged in field work with the Waikas.

In the same year, Prance indicated to De Smet (1985a) that he observed the Waikas of the Río Tototobi taking *Justicia* snuff without *Viola* and that "after the shaman took this, he was apparently in a trance."

In November 1986 Henrik Blohm and Schultes visited the Waika settlement near Platanal in southern Venezuela. There they found three plants employed in the preparation of intoxicating snuffs: *Viola* sp. (bark sample); *Anadenanthera peregrina* (sterile specimen, Schultes et Blohm s.n., ECON, VEN) and *J. pectoralis* var. *stenophylla* (sterile specimen, Schultes et Blohm s.n., ECON, s.n.). The names used for these three snuff-preparations are, respectively, *epena*, *yatowanaa*, and *machohara*. Repeated questioning of two knowledgeable Waikas revealed that the *Justicia*, cultivated in a banana-plot near the settlement, was used as an admixture not only to strengthen the *Viola*-snuff, but that it was also employed alone as the source of an hallucinogenic snuff. It was said to be "weaker" when used alone than either the *Viola* or the *Anadenanthera* snuffs.

Slightly toxic compounds appear to be rather widespread in the Acanthaceae; vasicine has been reported in one species of *Justicia* and 0.1% of a very bitter alkaloid from another (Hegnauer 1964). The apparent discovery by Holmstedt of small amounts of tryptamines in *J. pectoralis* and a similar finding by LeQuésne for the same species together with Hegnauer's report of alkaloids in two different species suggest that an in-depth phytochemical study of *Justicia*, especially of *J. pectoralis*, is long overdue.

There is a further point concerning *Justicia* that may here be relevant. A botanical collection from the Río Apaporis area of Colombia (Schultes et Cabrera 15244, COL) bears an annotation that the Puinave name of the plant is *ya-ko-*

yoó; the Puinaves call the *Virola*-snuff *yá-kee*; could this similarity of terms possibly indicate some connection between *J. pectoralis* var. *stenophylla* and *Virola*-snuff amongst these Indians?

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Note

Society for Economic Botany 41st Annual Meeting

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The Soma of the Rig Veda: What Was It?

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THE SOMA OF THE RIG VEDA: WHAT WAS IT?*

R. GORDON WASSON

In his paper Mr. Wasson summarizes his argument in favor of a mushroom, the fly-agaric called by mycologists *Amanita muscaria*, as the Soma of the Rig Veda. This mushroom was still being used as an inebriant by the shamans of remote tribes in Siberia only a few years ago. Mr. Wasson quotes from the Rig Veda to show how apposite are the poets' words to the fly-agaric, in most cases illustrating his points with colored plates. The Siberian tribesmen drink the urine of one who has taken the fly-agaric and find it as inebriating as the fly-agaric itself. Mr. Wasson raises the question whether the Vedic priests did not do likewise, marshalling certain evidence in favor of this view. He then explains how he thinks it happened that the identification of Soma has had to wait until now to be achieved, and finally he suggests certain textual *cruces* in the hymns that may be resolved by his discovery and outlines other channels of inquiry for fruitful research.

LOUIS RENOU WITH HIS VAST LEARNING in matters Vedic once said that the themes presented by Soma incapsulate, so to speak, the whole of the Rig Veda.¹ Soma saturates the Rig Veda, not merely Maṇḍala IX. So long as Soma remains unidentified—so long as it is an unknown plant in appearance, in its habitat, in the stages of its life cycle, in its hallucinogenic properties—the student of this extraordinary collection of hymns is gravely handicapped. The poems are filled with figures of speech, plays on words, allusive double meanings, that must remain blind to him. If from the play Hamlet the utterances of the Prince of Denmark were completely excised, what could we make of it? Soma plays the rôle of Hamlet in the Rig Veda. For three millennia Soma has remained unidentified and Vedic scholars have seemed disposed to give up hope. There have been so many unpersuasive tries at giving the plant an identity! Some scholars find peace of mind by imagining that the Vedic poets possessed only a fading memory of the plant, thus happily attributing to the poets their own disability. Yet others seek comfort by asking whether Soma from the outset was only a mythological concept. There may even be Vedic scholars so inured to the enigma that they will be upset by the dramatic entrance on stage of the long-absent *jeune premier*.

Almost ten years ago I approached the problem from the botanical field. I was generally familiar with the hallucinogens used in historic times in the Eurasian landmass. As I was too old to acquire a mastery of the Vedic language that would be useful to me, I enlisted the aid of a Vedic scholar, Dr. Wendy Doniger O'Flaherty, who dealt with all my questions about Vedic culture and linguistics and who wrote Part II of my book, the post-Vedic history of Soma. She is unable to be with us today but in her absence I gladly pay tribute to her patience with my queries and to her labors on my behalf. For long she was skeptical about my thesis but now that our book is out she authorizes me here today to say that she is a full-fledged convert.

For my principal source I relied on the scholarly translations of the Rig Veda published in the past twenty years, Geldner's and especially Renou's, so far as he had gone before his untimely death. I relied on the Rig Veda. The Vedic poets knew Soma if anyone did. The poets lived over generations, probably centuries, in various centers of Vedic culture. When we consider the nature of poets everywhere, always, can we imagine the Vedic poets singing the glories of a plant without using the descriptive terms, the tropes, that will serve as its hallmark, its signature? Sometimes I think it was to my advantage that I was untroubled by thorny questions of syntax, by the far-flung network of Indo-European roots and hypothetical etyma, by mythological themes as-

* Paper prepared for the International Congress of Orientalists, Canberra, Australia, January, 1971.

¹ *Études Védiques et Pāninéennes*, Tome IX 8.

ending deep into Eurasian pre-history. I read these lyrics in Renou's rendering as poetry. At first I had harbored the secret notion that Soma would turn out to be a member of the mint family, *Lagochilus inebrians* Bunge, growing in Bactria and there used as an hallucinogen as far back as we can trace its history. This mint, strangely, had never been suggested as Soma. But on reading Renou I quickly saw that Soma had to be a mushroom and specifically the fly-agaric, *Amanita muscaria* L. All unknowing, Renou was consistently describing this mushroom.

I repeat that I relied on the Rig Veda. The earliest commentators in India were suspect because they themselves may not have known what Soma was. Or it has been suggested to me that, even if they knew what Soma was, from the highest motives they may have engaged in mystification to throw posterity off the scent. The obliteration of Soma's memory may have been, in post-Vedic times, the goal of the priests' efforts. Over the past centuries Vedic exegetes have included some of the finest minds in the world of scholarship, but their efforts to identify Soma have failed and to follow them was to accept the guidance of the blind.

I will start with a précis of my argument, illustrating it with Plates. Then I will submit a second category of evidence, quite different and not essential to my case, but if it holds up, it is testimony of a kind to clinch my identification. Afterwards I will tell you why I think the identification of Soma has become possible only now. Fourthly, I will say why I do not attempt to answer certain challenging questions that are invariably put to me. Finally, I will suggest a few of the many perspectives that open up in the light of my identification of Soma.

I. The Rig Veda and the Mushroom

In reading Renou I quickly perceived that the poets speak neither of the roots, nor of the leaves, nor of the branches, nor of the blossoms, nor of the fruit or seed of Soma. These are essential components of the chlorophyll-bearing plants, and if the poets never mention them, Soma must have been without them. It must have been a mushroom. Soma grew on the mountain heights—

which, in Kashmir and the Indus plains, meant either the Himalaya foothills or the Hindu Kush, where the wild mushrooms that grow at sea-level in the forest-belt of Eurasia may be found at altitudes from 2,500 meters up. Right away one thinks of the fly-agaric, *Amanita muscaria* L., the mushroom of the Siberian shaman. This superb, this regal plant plays a central rôle down to our own days in the religious life of the Uralic Ob-Ugrians and Samoyeds, and also all but one of the Paleo-Siberian peoples. How odd that no one had ever before considered a mushroom, though the fungal world offers a number of hallucinogenic possibilities.

The fly-agaric first appears as a fluffy ball, dazzling white. As it swells and grows upward it bursts its white envelope and its brilliant red skin shows through the fragments of the white envelope that continue to adhere to the cap. In Plate I, I offer an assembly of these fly-agarics, including young and mature specimens. Sometimes the white patches that stud the cap in maturity are wholly or partly washed away by rain.

I.1. The poets of the Rig Veda habitually compare Soma with the Sun, with Fire. Soma shares its liquid nature with the rain, its brilliance with the lightning and with the fire that lightning stands for. I think our Plates justify this, especially Plate II. Hymns IX 66 and 67 contain apostrophes to Soma under the name of 'Fire' and the Sun-imagery runs all through the hymns. Here are a few examples:

- | | |
|------------------------|--|
| I 46 ^{10ab} : | Light has come to the plant, a sun equal to gold . . . |
| I 135 ^{3b} : | [Soma is] thy precise share, accompanied by the rays that are his in common with the sun |
| IX 2 ^{6c} : | [Soma] shines together with the sun . . . |
| IX 28 ^{5ab} : | [Soma] has made the sun to shine. (IX 37 ^{4bc} also.) |
| IX 61 ^{3c} : | [Soma] joins forces with the sun's rays. |
| IX 71 ^{9b} : | he has clothed himself with the fire-bursts of the sun. |
| IX 76 ^{4c} : | he who has been cleansed by the sun's ray. |



PLATE I · The Soma of the ṚgVeda

English: 'toadstool', 'fly-agaric'; German: *Fliegenpilz*; Russian: *mukhomor*; Ob-Ugrian: *pono, pano, pongo, pango*; Vedic & Sanskrit: *Soma*; Old Persian: *Haoma*.

PLATE II · The Single Eye

IX 97^{46c} [Soma] who has for eye the Sun





PLATE III

Nirñij;

vesture-of-grand-occasion

PLATE IV • *Pávamāna*

IX 86^{29d} Thine, O *Pávamāna*, are the lights, the sun.





PLATE V · *Pavitra*; the Filter

IX 86^{40cd}: King, having the filter for chariot, he has attained the victory prize;
with his thousand studs, he conquers mighty renown.



PLATE VI
The Sun-Plant;
the Fire-Plant



PLATE VIIa

By day he appears *hári*

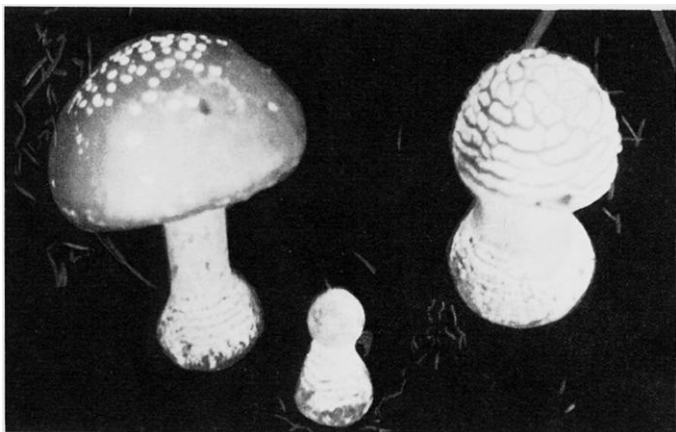


PLATE VIIb

By night silvery white



PLATE VIII
Pillar of the Sky

- IX 86^{32a}: [Soma] wraps himself all around with the rays of the sun.
 IX 97^{31d}: [once] born, thou [Soma] didst fill the sun with rays.
 IX 111^{3b}: [The Soma] races against the rays [of the sun], vehicle beautiful to see, celestial vehicle beautiful to see.

I.2. The flaming steeds of the Sun, *etaśa*, are a flaming red-yellow, and Soma is of the same dazzling color. Not only is the parallel with the sun revealed in the red or reddish-yellow cap, but the white studs suggest the sun's rays, and for 'Soma' the poets sometimes substitute *pávamāna*, the tawny yellow liquor expressed from Soma in the course of the liturgy, as illustrated in Plate IV.

- IX 27^{5ab}: Here he is, racing with the sun, *Pávamāna* in the sky . . .
 IX 63^{7ab}: Purify thyself with this stream by which [Soma] madest the sun to shine.
 IX 63^{8ab}: *Pávamāna* has hitched *Etaśa* [the sun's steed] to the sun . . .
 IX 64⁷: [the Soma's flowing liquor] like the rays of the sun.
 IX 86^{29d}: Thine, O *Pávamāna*, are the lights, the sun.
 IX 97^{41d}: the juice has engendered light for the sun.

I.3. Time and again the poets call Soma the Pillar or Mainstay of the Sky, a figure of speech that is understandable after looking at Plate VIII, the sturdy column topped off with an appropriate capital. Here are a few of the many relevant passages:

- IX 2⁵: The ocean [of Soma] has been cleansed in the waters; mainstay of the sky, the Soma in the filter, he who is favorable to us.
 IX 72^{7ab}: In the navel of the earth [is situated the Soma], which is also the mainstay of the sky . . .
 IX 74^{2ab}: Mainstay of the sky, well laid, the full *aṃśu* runs throughout everything . . .
 IX 86^{35cd}: . . . thou sittest in the vessels, having been pressed for Indra, inebri-

ating drink, which inebriates, supreme mainstay of heaven, [Soma] who gazes in the far distance.

- IX 86^{46ab}: He has spilled forth, mainstay of the sky, the offered drink; he flows throughout the world . . .
 IX 87^{2cd}: . . . father of the gods, progenitor of the moving force, mainstay of the sky, foundation of the earth.
 IX 89^{6ab}: Mainstay of the sky, foundation of the earth, all establishments are in the hand of this [Soma] . . .
 IX 108¹⁶: Enter into the heart of Indra, receptacle for Soma, like rivers into the ocean, thou [O Soma] who pleasest Mitra, Varuṇa, Vāyu, supreme mainstay of heaven!
 IX 109^{6a}: Thou Soma art the mainstay of the sky, . . .

I.4. From our various Plates we see now why it is appropriate that our poets speak of the swollen 'udder' of Soma:

- III 48^{3ab}: [Indra] looks toward the sharp Soma as toward the udder.
 VIII 9^{19a}: When the swollen stalks were milked like cows with [full] udders
 IX 107^{5ab}: Milking the dear sweetness from the divine udder . . .

I.5. The 'cap' of the fly-agaric is called 'head' in Vedic and Sanskrit, as it is in many, perhaps most, of the languages of the world. The word in Vedic is *mūrdhán* or *śtras*

- IX 27³: This bull, heaven's head [*mūrdhán*], Soma [is] pressed.
 IX 68^{4cd}: While Soma enters into contact with the fingers of the officiants, he protects his head [*śtras*].
 IX 93^{3abc}: The udder of the cow is swollen; the wise juice is imbued with its streams. In the vessels the cows mix with their milk the *mūrdhán*.

I.6. When the poet says:

- IX 70⁷: The hide is of bull, the dress is of sheep

we understand what he means by looking at Plate III. Here the red skin of Soma shows through the

woolly tufts of the envelope, the hide through the 'dress of sheep'.

This Plate III also illustrates well

IX 69⁵: With unfading vesture, brilliant, newly clothed, the immortal *hári* wraps himself all around. By authority he has taken the back [*i.e.*, the vault] of heaven to clothe himself in, a spread-cloth like to a cloud . . .

and

IX 71²: . . . He sloughs off the Asurian color that is his. He abandons his envelope . . . With what floats he makes continually his vesture-of-grand-occasion.

His 'vesture-of-grand-occasion', that is to say his *nirñtj*. The traditional, the accepted meaning of *nirñtj*, is the milk that is mingled with the juice of Soma after pressing. But is there any objection to giving this word, when used by the poets of the Rig Veda, a dual meaning, the milk that is white like the glorious dress of the exalted plant, and the dress of the plant that is white as milk of cows? To me this double metaphor seems the kind of word-play that the Vedic poets were addicted to, as they shift with lightning-speed, with quantum jumps, from one metaphor to another.

I.7. On occasions the poets speak of the eye, the single eye, of Soma:

I 87^{5ab}: We speak because of our descent from the ancient father; the tongue moves with 'the eye of Soma'.

IX 9⁴: . . . [Soma] has encouraged the rivers free of grief, which have strengthened *his single eye*.

IX 10^{8ab}: Indeed *the eye* is altogether with the sun.

IX 10⁹: The sun [*i.e.*, Soma] looks *with the eye* towards the dear places and the highest place of heaven, . . .

IX 97^{46c}: [Soma] who has *for eye* the sun.

Could there be a more compelling metaphor for Soma than 'the single eye' of the divine plant, illustrated in Plate II? When the poet refers to the eye of the sun, as he frequently does, may he not mean Soma?

I.8. Then there is the question of the filters. After the juice is expressed from the plant, this juice runs down to the woollen filter and through it. That filter is clear. But there is another filter, illustrated by Plate V.

IX 86^{40cd}: King, having the filter for chariot, he has attained the victory prize; a thousand studs, he conquers mighty renown.

IX 66^{5abc}: Thy clear rays spread over the back of heaven, the filter, O Soma, . . .

IX 67²²⁻²⁵: This Soma, which today circulates in the distance, which is a cleanser, may it cleanse us in the filter! The filter that has been spread in thy flame, O Agni, . . . with it, cleanse us with the fruits of sacred songs! With these both, the filter and the fruits [of song], O God Savitr, cleanse me through and through!

Here Soma is addressed under the name of Agni. Metaphorically the miraculous plant seems to share every attribute of Agni,—flame-colored, subtle, it purifies with its filter as fire does with its flames.

IX 83^{2abd}: The filter of the burning [Soma] has been spread in heaven's home. Its dazzling mesh was spread afar . . .

IX 86^{30ab}: As for thee, O Soma-juice, thou art clarified in the filter so as to establish thyself [in] space for the gods.

IX 86^{32ab}: The Soma envelops himself all around with rays of the sun, . . .

IX 91^{3cd}: By a thousand paths free of dust, Soma, armed with verses, knowing the Word, the Sun passes the filter.

We have seen that the head of Soma is likened to the vault of heaven: its studs are likened to the rays of the sun, caught on the skin of the 'back of heaven' and serving as a filter for the rays of Soma arrived from heaven.

I.9.

IX 97^{ad}: By day he appears *hári*, by night silvery white

says the poet. Our Plates IIIa and IIIb illustrate this verse well. In daylight the dazzling red of the fly-agaric's pileus dominates the sight, but on a moonlight night, all colors vanish and only the silvery whiteness of the *nirṇṭj* is to be seen.

I rest my case on these illustrations. I could multiply my examples, my quotations, my Plates, but they would only confirm the evidence I have given. Conversely, so far as I know there is not a single reference to Soma in the Rig Veda that is inconsistent with my solution. We must not ask the poets to describe Soma as a modern botanist would do. We must be satisfied with something different, we must see the plant as a poet sees it. If we discover that the poets never mention the roots or branches or blossoms or seed of Soma, if we find them placing the plant high in the mountains, if they use a succession of tropes each appropriate for the fly-agaric, indeed fitting it like a glove, if we discover no word in the Rig Veda inconsistent with this plant, then indeed we have hit on its identity. All these elements are so many numbers for a combination lock. A single one might mean nothing, or two or possibly three might mean nothing, but when each of them and all of the lot of them together fit the fly-agaric to a T, then at last the door to an ancient enigma swings open. How better could poets describe the superb, the divine, plant? What plant other than the fly-agaric fits these poetic figures? Have not the poets exalted their adored Soma in terms that are unmistakable? The god is suitably enshrined in a plant radiantly beautiful, *hári*, dazzling. By a miracle of nature the hallucinogen is clothed in vesture suitable to its high station. These correspondences of our Plates recur without ceasing in the hymns, the poets play with them, ring all possible changes on them. There are other parallels, important ones, that I must omit. I will mention just one example: the poets repeatedly apply to Soma the word 'navel', *nābhi*. This has its analogies in the fungal vocabularies of the vernaculars spoken from France and Russia through Turkey

to Korea and Cambodia! It seems that 'navel' is an archaic metaphor throughout Eurasia for a mushroom.

II. The Third Filter

I now turn to another category of evidence, not essential to my case. Alas, it does not lend itself to illustration with colored plates.

As an inebriant the fly-agaric possesses a property that is peculiar to it, distinctive, unique. Perhaps the Indo-Iranians made no use of this property. But let us read the Rig Veda with it in mind, for if they did resort to it, this would be additional proof—and what proof!—that we had identified the divine plant. It would rivet the superb fly-agaric to the Divine Soma.

Twice in the Rig Veda there is mention of a Third Filter.² This 'Third Filter' awaits explanation. My suggestion offers perhaps a solution to the crux: if I am right we are treading here on the most holy ground in the Vedic religion. In every genuine religion there are acts and objects and words that evoke awe in the believer, that elicit a tug at the sinews of his heart. The Faithful are then in the presence of a Holy Mystery. As we read Maṇḍala IX, there is for me an overwhelming sense of this awesome reverence, no matter though we are far removed in time and place and of a far different cultural orientation. Take for example Hymn 74: it consists of a series of numinous phrases, instinct for the worshippers with religious feeling. Verse 4 ends with an astonishing line. Renou translates it thus: *Les seigneurs à la vessie pleine compissent le Soma mis-en-branle*. Geldner is in substantial agreement. Dr. O'Flaherty gives me this rendering: 'The swollen men urinate the on-flowing Soma', the 'men' being the priests who are presiding over the Soma sacrifice, and the men are swollen, in the opinion of Geldner and Renou, because their bladders are full.³ In the Rig Veda there are a number of allusions to the

² IX 73^{ab}; IX 97^{ab}.

³ Renou thinks the 'men' refer to the Maruts. He had recourse to this solution as a *pis aller*, *faute de mieux*, to make some sense out of the passage. But throughout this run of hymns the 'men' are always the officiating priests.

passage of Soma through the belly, the entrails, of Indra, some of these allusions expressing considerable anxiety. I suggest that these become meaningful if we understand that Soma is being filtered through a Third Filter, the human organism, into the urine, and that this is attended by genuine dangers of misadventure.

Do not the poets mean what they say? The priests officiating at the sacrifice piss the on-flowing Soma. They have drunk the juice of the plant and their urine is impregnated with the active agent. Why is this strange or shocking? Those who are familiar with the anthropological facts about the fly-agaric in neighboring Siberia know how this hallucinogen works. He who drinks the juice of the hallucinogenic mushroom saves his urine, and others drink this urine with the identical inebriating effect, perhaps heightened, for there is reason to think that certain nauseating ingredients in the original mushroom are filtered out in passing through the human organism. This use of the urine can be repeated over and over again, it is said, until it has passed through five human bodies, when at last it loses its virtue.

I know that Vedic scholars are not agreed on the meaning of IX 74^{4d}. I have followed Renou and Geldner, and the argument lies between them on the one hand and those who put a different construction on the verse. As I am no Vedic scholar, I will remain on the sidelines. But there are two other verses that seem to me to show a knowledge of this unique property of Soma-urine. In VIII 4¹⁰ the poet says this:

Like a thirsty stag, come here to drink;
 Drink Soma, as much as you wish.
 Pissing it out day by day, O generous one, you have
 assumed your most mighty force.

(Translation by Daniel H. H. Ingalls)

Indra drinks Soma and he pisses it out every day. In II 34¹³ the Rudras in the shape of horses seem to have pissed Soma likewise. When one drinks tea or coffee or milk or beer, one later urinates, not tea or coffee or milk or beer, but urine. Why does Indra, why possibly do the Rudras, urinate Soma? How did the Vedic priests learn that Soma-urine was also Soma, unless they had drunk it? I put the question and will await with lively interest the

answer. Even if Geldner and Renou were both wrong in their translation of IX 74^{4d}, there remains Indra who *daily pisses Soma*.

We should not expect a lengthy discussion of this question of Soma-urine in the Vedic hymns. It was a Mystery of their religion, familiar to all the poets, but like all religious Mysteries to be discussed only with awe in the voice and in a whisper.

Though there are only these two or three references to the drinking of Soma-urine in the Vedic hymns (apart from the allusions to Soma passing through the belly and entrails of Indra), we find supporting evidence elsewhere and precisely where we should find it in the circumstances, given the general acceptance and sacred nature of the Mystery. It occurs casually, incidentally, like an accidental disclosure in a conversation of a secret known to all. Thus in the Avesta, Yasna 48.10, Zarathustra angrily excoriates those who use inebriating urine in the sacrifice: 'When wilt thou do away with the urine of drunkenness with which the priests evilly delude the people?' The Parsis, descendants of the Zoroastrians, to this day consume urine in their religious devotions, though only in symbolic amounts and only bull's urine.⁴ The Manichaeans, whose religion was an off-shoot of Zoroastrianism, exercised considerable influence in China for some centuries and from a late date in Fukien Province there survive two reports by a high civil servant to his superiors of the Chinese Establishment criticizing the religious activities of those Manichaean sectarians. In their devotions, he said, they consume too many *red mushrooms* and moreover they were making use of urine, apparently human urine.⁵ According to a well known Brāhmaṇa story⁶ Indra drinks so much Soma that it flowed from all the orifices of his body *as well as from his bladder*. As a final citation,

⁴ J. J. Modi: *The Religious Ceremonies and Customs of the Parsees*, Bombay, 1923; 2nd edition 1937. In 2nd ed. p. 93 and index entries under 'gaomez', 'nirang', and 'nirangdin'.

⁵ *Un Traité manichéen Retrouvé en Chine*, traduit et annoté par Ed. Chavannes et P. Pelliot, Paris, 1912, pp. 292-340, especially pp. 302-305 and 310-314.

⁶ *Taittirīya Saṃhitā* 2.3.2.5-6, *Śatapatha Brāhmaṇa* 5.5.4.8-9 and in most detail 12.7.1.1-9.

in the Mahābhārata we find a quaint apologue, interpolated late into the text, telling how a *mātanga* (the lowest of the low) invited the holy man Uttanka to drink his urine to quench his (Uttanka's) thirst and how Uttanka, feeling insulted and indignant, refused the proffered beverage, only to learn later that the *mātanga* was Krishna in disguise who had been offering him Soma-urine! Uttanka thus lost forever the chance to join the immortals.⁷

If my interpretation of the Rig Veda in the matter of Soma-urine meets with resistance in the West, in India in some quarters it has proved acceptable, even illuminating. A lady of English origin writes me that she was in a circle of Indian ladies and one of them, a ranee, was expatiating on the infatuation of her husband, the rajah, for a certain *sādhu*. Why, he even wished to drink the *sādhu*'s urine, she said. The Indian ladies accepted this calmly, as though not surprised, and my correspondent therefore remained silent. Again, an Indian intellectual says that the present-day *sādhu* conveys his spiritual powers to his disciples in any one of four ways: (1) by a 'laying-on' of hands, precisely as in our Church; (2) by having his disciple repeat incessantly for long periods a certain *mantra*; (3) by having him fix his gaze undeviatingly on the *sādhu*'s countenance for long periods; and finally (4) by giving his favored disciples the privilege of drinking his urine. These instances of contemporary urine-drinking may come down from the time when urine was still impregnated with the essence of Soma.

I do not assert that the Vedic priests drank Soma-urine. But the case for the practice is so strong that it deserves most careful consideration. The intense repugnance in the West for urine drinking is only an anthropological trait of Westerners, and we must be on our guard against being swayed by our tribal traits.

III. The Quest for Soma

Some of you are doubtless asking how it comes about that the identity of Soma is being discovered now, and by one who knows no Vedic.

The Indo-Iranians coming down from the North exalted a plant in terms breathtaking for us. But for three millennia Soma, the exalted plant, has been absent. The Hindus, strangely for us, disclosed no curiosity about it, and as for the West, our speculations in recent times have been only blind guesses, convincing no one, often not even those who propounded them. Of late I find more and more scholars receptive to the idea that Soma for the poets was already a shadowy non-Plant. Nature abhors a vacuum and in the absence of the genuine plant, our scholars seem prepared to weave for the poets a myth that the poets never knew,—weaving a myth for the ancients, to fill the vacuum in our own knowledge.

For me, the trouble is clear and simple. The Vedists have allowed themselves to be miscast. When you seek the identity of a plant you go to a botanist, not to a Vedist. But then why have not the botanists discovered it?

The answer lies in the inaccessibility of the Rig Veda. Cultivated circles in the West were first alerted to the existence of the Rig Veda in the second half of the last century. The Rig Veda could be read only by the Vedists, a generation of scholars of the highest eminence tilling a field remote from the main thoroughfares of western studies. The botanists had no direct access to the hymns, but, what was worse, they thought they had. A number of translations tumbled from the presses, and botanists working in the Indian field read them. But the translations of the period—Wilson and Cowell's, Griffith's, Langlois'—were not intended for scholars or scientists. They were an effort to convey to the reading public in the West the treasure-house of early religious poetry that had just been uncovered in India, composed in a language related to our Western languages. The translators were not in the forefront of Vedists. Their translations sound like what cultivated circles enjoyed reading in the Victorian age. They were 'poetical' in the vein of the *Idylls of the King* but without Tennyson's power of versification. They were flowery, rotund, some might say flatulent, giving a pseudo-sense to all passages that neither translators nor Vedists understood, bowdlerizing the text to caress the prudish Victorian

⁷ *Āśvamedha Parvan*, 14.54.12-35.

ear. Small wonder that George Watt, the foremost botanist of the British *rāj* but who knew no Sanskrit much less Vedic, is quoted as saying, '... the vague and poetical descriptions given of the Soma make any scientific identification impossible.'⁸

And so the Vedists were left with the Soma problem. Unhappily they did not demur: they accepted the role of botanists, for which their qualifications were not readily apparent. The world has ever since looked to them for an identification that they could not supply, could not be expected to supply. Speaking for the Vedists, Professor Kuiper is a thousand times right in saying that 'the complexities of the problem should not, indeed, be underestimated.' The identification of Soma must take the seeker far beyond the confines of Indo-Iranian studies proper, as Professor Kuiper adds. There is where I have come from.

But we discover a further difficulty. British botanists in India performed a Herculean task in mapping the vegetation of that vast land in a long series of specialized monographs culminating in an admirable encyclopaedic work, *Dictionary of the Economic Plants of India*, edited and partly written by George Watt. They confined themselves, however, to the phanerogams—the seed-bearing plants—and they neglected the fungal flora. No one seems to have thought of a mushroom in the rôle of Soma. The English people, mycophobes to the core, ignored the 'toadstools' of India.

One more consideration: from a botanist's point of view the distinctive feature of Soma is that it belongs to the world that Louis Lewin, the pharmacologist, first called *Phantastica*, that today is usually named the plant 'hallucinogens', that the chemist and pharmacologist designate as the psychotropic or psychotomimetic plants. This restricts the area of inquiry. The specialized study of the natural hallucinogens is only a few decades old: before then there were only the old travel

books and the field notes of anthropologists, difficult to come by and to collate.

Many have observed that discoveries in the realms of geographical or intellectual exploration arrive in a measured sequence, when the days are fulfilled that they should be made, and only in recent years, after the translations of Geldner and Renou became available, could the world approach the Soma problem with hope of finding the answer. The fortunate person who makes the discovery is an accident of history, arriving as he does at precisely the right moment and happily possessed of the needed information derived from diverse disciplines hitherto not associated together. I am certainly one of the first persons with any botanical background to study the recent scholarly translations of the Rig Veda concentrating on the Soma question. My late wife and I had been concerned with ethno-mycological problems for decades. On the strength of the folklore of Europe and the etymologies of the fungal words in the languages of Europe, we had advanced in the 1940's the daring idea that a mushroom had once figured in the religious life of our remote ancestors. When we later learned of the rôle played by the fly-agaric down to recent times in the shamanic rites of Siberian tribesmen, we were overjoyed, thinking that the Siberian usage vindicated our previous hunch. Little did we imagine that we were on the road to what was to be a discovery of larger scope.

In 1953 we were diverted to Mexico, where we later revealed to the world the part played by hallucinogenic mushrooms in the religious life of the Indians of southern Mexico, and, thanks to the indispensable aid of Professor Roger Heim, then Director of the Muséum National d'Histoire Naturelle, upwards of a dozen hallucinogenic species received scientific identities for the first time. We took advantage of our Mexican explorations to extend our acquaintance to the phanogamic hallucinogens.

Certain English scholars have lately dwelt on the divorce that has taken place in our own generation between the two faces of our culture, the scientific and the humane. But for the ethnobotanist (including the ethno-mycologist) these

⁸ Quoted from Max Müller, *Collected Works*, London, Vol. X, 1888, p. 223. I have not found the observations attributed by Müller to Watt in Watt's published statements.

two faces are still joined in matrimony. As a scientist he knows his plants; as a student of human cultures, he knows the rôle they play in man's daily life. When I read the Rig Veda as poetry, it is self-evident that the poets are deifying, in lyrical language of breathtaking poignancy, the hallucinogenic fly-agaric of the Siberian taiga, *Amanita muscaria*, in pre-history the divine inebriant of all Eurasia.

What is this discovery that I think I have made? Have I done more than identify some plant or other that happened to be named in hymns composed millennia ago? When the Vedic poet sang that most famous of all the verses of the Rig Veda,

We have drunk the Soma, we are become Immortals,
We are arrived at the Light, we have found the Gods.
What now means hostility to us, what the malice of mortal,
O Immortal Soma! (VIII 48³)

he was giving utterance to an epitomé of the whole collection. What are we to make of it?

The poet throughout the ages has pursued a serious calling intimately associated with prophecy. In this verse we feel the potent afflatus of Soma, the ecstasy inspired by the Divine Hallucinogen. The poet is certainly not performing an arid exercise in versification and vocal music about a plant that he had never seen. Nor are we discussing merely an 'invigorating' inebriant analogous to alcohol. We are dealing here with the 'enthusiasm' of the Poet, in the original and now obsolete sense of that word, its etymological meaning of divine possession, poetic phrenzy, supernatural inspiration. The engine behind the myth and ritual of the Rig Veda is this 'enthusiasm'. If I am right, here is where we are arrived, this is the secret of our discovery. We have identified a plant considered understandably as miraculous, divine, by the Aryans of long ago. For them, in their stage of cultural evolution, the fly-agaric threw open the portals to ecstasy.

Here I must point out, and emphasize, that my identification of Soma is not necessarily incompatible with the superstructure of ritualistic and mythological thinking elaborated by post-Vedic exegetes. To this plant the poets anchored their

poetic fancy, and by welcoming this identification we do not need to discard such thinking. It supplements and controls our understanding of the ritual and mythology.

IV. The Vanishing Act

If Soma was the fly-agaric—and I am confident that it was—why was it abandoned? How was it possible for the identity of the Divine Plant to be forgotten? Why, when the priests came to use surrogates, did they not choose another mushroom? Since the Aryan culture flourished in Vedic times chiefly in the hot, low-lying Indus plains, how do we explain the figures of speech in the hymns that so truly and vividly describe the living plant growing in the mountains?

These questions are natural and have been put to me many times, occasionally in a challenging, abrasive tone, the questioner not staying for the answers. But I would point out that they bear not at all on my identification of Soma. This rests four-square on the words of the Rig Veda. If the Rig Veda speaks in unmistakable terms about the fly-agaric as Soma, if the door with a combination lock has finally sprung open in response to a wide assortment of Vedic evidence now for the first time viewed as an harmonious ensemble, that settles the problem. I am concerned with Vedic times. It is not incumbent on me to face the problems of post-Vedic history, an area where botany has only a minor rôle to play. When the Indologists concern themselves with Soma in post-Vedic times, I would suggest they keep in mind one fact pertaining to mycology: the fly-agaric, like most fungi, does not lend itself to cultivation and the yield, always a finite quantity, each year may vary widely, especially in areas where the rainfall is not dependable. In years of drought there would be virtually none. The crop also hinges on the warmth of the summer, apparently on the amount of sunlight, and even on the nature of the rainfall, which should be a gentle, steady rain rather than the violent rain of thunderstorms. In northwest India there may have been times when access to the source of supply, high in the mountains, would be cut off by hostile elements in the native population. But it must be emphasized that the fly-agaric is normally one of the commonest mushrooms and

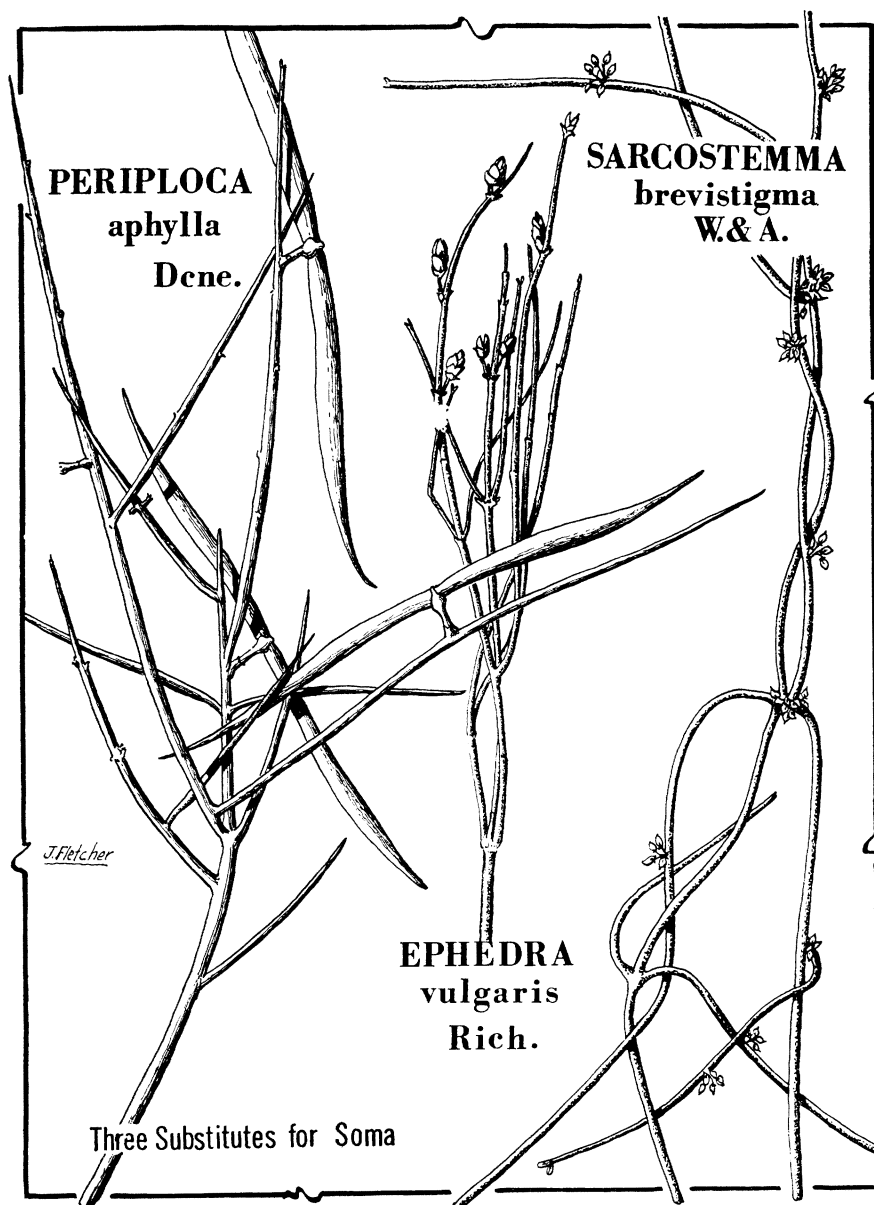


PLATE IX

in ordinary times abounds among birch trees, and is found also among conifers.

Only one thing is certain: the priests must have been chronically bedeviled by questions of procurement.⁹ Since a well-organized priestly hierarchy would hardly allow the cult to falter for want of the Holy Plant, from the outset there must have been an official surrogate to use in emergencies. Was that surrogate perhaps rhubarb?¹⁰ Rhubarb would be an ideal surrogate, with red fleshy stems, easily stripped of its leaves, a small plant yielding a juice that if generously mixed with honey or milk became not only palatable but pleasant. Of course the juice of unfermented rhubarb has no inebriating properties.

As the conquest of India by the Aryans progressed the problems of procurement must soon have become insuperable. The Soma sacrifice, it

⁹ Did the priests initially have recourse to porters who traveled to the far north, to the forest belt of Eurasia, to assure their supplies of the Divine Plant? Two such porters could have carried loads of dried fly-agaric to last perhaps a whole year. Almost a millennium later Herodotus (IV 33) tells us of an ancient trade route, originating long before his time, serving the Temple of Delos: from the Hyperboreans (whoever they were), sacred elements wrapped in wheaten straw were carried each year to Greece, the nature of the elements being withheld from us. The bearers, who were originally two maidens accompanied by a band of male escorts, enjoyed freedom of passage as they were passed from tribe to tribe with their holy charge.

¹⁰ I derive this suggestion from the discovery by the eminent Norwegian scholar Georg Morgenstierne of names for rhubarb in archaic languages still being spoken in Afghanistan, Katei of the Kafir group and Khovar of the Dardic family, that point to an etymon in Vedic, *svātara, which is used in the Rig Veda as a term of enhancement for Soma. A cognate term for rhubarb may also exist in Prasun, another Kafir tongue. Entry 12762 in R. L. Turner's *Comparative Dictionary of the Indo-Aryan Languages*.

Rhubarb had been suggested as the genuine Soma, though without conviction, first in 1884 by Albert Regel, a botanist in the employ of the Russian government, then by Rudolph von Roth, and more recently by Sir Aurel Stein, Karl Hummel, and R. C. Zaehner. See our *SOMA Divine Mushroom of Immortality*, pp. 114, 132, 140, 143. Morgenstierne's suggestion derives from linguistic evidence while their guesses are based on the presence of rhubarb in the area.

seems to me, must have been performed almost always with surrogates, until finally most priests lived out their lives without having seen the genuine plant. They appear to have turned in the end to various species of climbers, *valli*, in the absence of Soma, all these plants yielding juices with a vile taste and no hallucinogenic properties and all of them being widely recognized among Brahmans as substitutes. (Plate IX)

How different from the early days in Kashmir, when the sacrifice itself took place, we are told, on the mountain tops and the priests doubtless saw the glorious plant growing wild in its natural habitat! But with the passing of time all this changed. In the last batch of hymns to be accepted into the canon of the Rig Veda, the poet says:

One thinks one drinks Soma because a plant is crushed.
The Soma that the Brahmans know, that no one drinks.
(X 85³)

These later hymns reveal a sharp deterioration in religious tone and marked linguistic changes. This verse may have expressed the turning point. When it was composed I suggest that the fly-agaric, Soma, had lately been abandoned, but at that moment the Brahmans, including the composer of this hymn, though they were not telling, still remembered what Soma was.

V. Soma = Fly-Agaric: Some Implications

Daniel H. H. Ingalls, Wales Professor of Sanskrit at Harvard, has recently endorsed my identification of Soma,¹¹ though with serious reservations as to my theory of Soma-urine drinking, and he added:

The greatness of a discovery lies in the further discoveries that it may render possible. To my mind the identification of the soma with an hallucinogenic mushroom is more than the solution of an ancient puzzle. I can imagine numerous roads of inquiry on which, with this new knowledge in hand, one may set out.

Having said this, Professor Ingalls proceeded to

¹¹ An earlier version of this paper was read at the annual meeting of the American Oriental Society in Baltimore, April 15, 1970.

outline one such 'road of inquiry'. In truth, if I am right in identifying Soma with the fly-agaric, the opportunities ahead are many, at every level. I have already suggested that *nirṇij* carries a double meaning not hitherto suspected. I have called attention to the 'single eye' of Soma and asked whether the 'eye of the sun' has been fully explored as a metaphorical designation for Soma. If I am right, this trope may have left a legacy in the folklore and religion and art of Eurasia that runs far beyond the scope of our paper.¹² The whole of the Rig Veda will have to be studied afresh for allusions pertinent to the fly-agaric¹³ and hitherto misread or unread.

In the fly-agaric we find at last the explanation for the name of the divinity Aja Ekapād. Abel Bergaigne with extraordinary prescience arrived at the correct etymology of the name but stopped short of the identification. He said that Aja Ekapād is the *Non-né Unipède*, the 'Not-born Uniped'.¹⁴ The fly-agaric has only one 'foot', and he is *aja*, 'not-born', as he comes into existence miraculously, without seed, child of the lightning and the waters. (Curiously, in Mexico among the Mazatec Indians the hallucinogenic mushrooms bear a name that seems to express the same figure

of speech, 'that which springs forth' miraculously, not from seed like all other creatures.) In the Rig Veda the full name Aja Ekapād is cited six times, always in hymns to the Viśvadevas, and accompanied in five of the citations by another divinity, Ahi Budhnya, the serpent of the depths, a chthonic being who invariably guards the holy plant throughout Eurasia. That Aja Ekapād is another name for Soma, perhaps already archaic in Vedic times, finds support in RV X 65¹³, where the epithet proper to Soma, 'Mainstay of the Sky', is applied to him. Pliny¹⁵ tells us of a single-legged folk (*monocoli*) said to live in India who take their siesta in the shadow of their own single foot. Is not this the Vedic personification of Soma, Ekapād, which by the time it reached the Mediterranean 1000 years later had become confused with a genuine people, and is not this fabulous folk revealingly linked in Pliny's text to a parasol mushroom? In RV X 82⁶ *aja* used separately is linked to the navel, *nābhi*, and thus two seemingly disparate metaphors are intelligently reconciled in the divine mushroom. Even more exciting, at the far end of Eurasia, is the myth of the Chukchi to explain thunder. The Chukchi live in the Peninsula known as the Chukotka, opposite Alaska. They are linguistically related to the Koryak and the Kamchadal. The Russian anthropologist V. G. Bogoraz¹⁶ reports that thunder is

¹² For example, I refer to Herodotus IV 27. The personification of the fly-agaric as a race of little people, of elves or sprites, is familiar in Siberia. The Issedonians lived beyond the Scythians and on the limits of Herodotus' personal knowledge, and from them he heard tell of a race of one-eyed people ('Arimaspi') living deeper in Asia. Is it not possible that hearsay reports of this 'race', transmuted through time and distance, had their origin in the personification of the one-eyed fly-agaric 'race'? . . . In the new World those who adore the hallucinogenic mushrooms speak of them, in Spanish, as *duendes* (elves, sprites). If brought over from Asia, this belief ascends deep into pre-history and establishes the antiquity of the traditions of mushroom worship.

¹³ Take, for instance, that curious phrase, frequently arresting the attention of commentators, *pari math*, describing the twisting, rotating grasp with which the plant is seized, these words re-enforcing each other. What is this but the characteristic twisting motion of the wrist with which the countryman gathering wild mushrooms ordinarily seizes the plant? RV I 93⁶, IX 77². (For this comment I am indebted to Dr. Heinrich von Stietencron of Heidelberg.)

¹⁴ *La Religion Védique*, Vol. III, pp. 20-25.

¹⁵ Quoting Ctesias: *Hist. Nat.* VII ii 23 (Loeb translation, Vol. II, p. 521) Cf. *supra*, fn. 12, the people with a single eye reported by Herodotus. Ctesias derived his information from Megasthenes. See J. W. McCrindle: *Ancient India as described by Megasthenes and Arrian*; 1877; p. 76.

¹⁶ Bogoraz, Waldemar: *The Chukchee*, Memoir of the Amer. Museum of Nat. Hist. Jesup North Pole Expedition. 1904-1909, pp. 322-323. In the English translation 'one-sided' is confusing. The Chukchi original of this as well as Bogoraz's Russian translation do not appear in the Russian publications of Bogoraz. In an analogous context, however, 'one-sided' appears in the Russian text as *ljudi-polovinki* rather than *odnobokij*, as one might have expected, and this would seem to mean a race of people equipped with only half of man's attributes, a human organism split down perpendicularly in the middle. This would fit the personification of the fly-agaric as a tribe of people having only one pedal extremity, only a single eye, etc. The Siberian tribes

the rattling noise made by girls [the 'fly-agaric girls' of Chukchi parlance] playing on a spread sealskin. Rain is the urine of one of the girls. In one tale the lightning is described as a one-sided man [a 'Uniped', *monocolus*] who drags his one-sided sister along by her foot. She is intoxicated with the fly-agaric. The noise caused by her back as it strikes the floor of heaven is thunder, her urine is the rain.

In this myth we find the same forest-belt themes as in the Vedic hymns—Ekapād (he of the single foot), the fly-agaric inebriant, and the thunder-storm complex.

But let us go further into Siberia. The fly-agaric complex of the forest-belt is of absorbing interest from many points of view. That the use of Soma, the inebriating mushroom, has survived there until recently, even if only in a degenerate state and restricted to two shrinking areas, is a remarkable fact. In our own time the use of the fly-agaric has been described, not only in the Chukotka, and also far to the West, in the valleys of the Ob and the Yenisei. The words used for the fly-agaric in the various tribes, the associated meanings of these words and their etymologies, the part played by reindeer in the urine-drinking of the natives, the personification of the fly-agaric mushrooms as dwarfs or sprites, the petroglyphs dating from long ago—all these aspects of the fly-agaric cult deserve our attention. But I will pass over these to the point of my story. (Plate X)

Many students of the customs and folklore of the forest-belt of Siberia have remarked on the reverence shown everywhere for the Siberian birch,

under tabu influences devise many fanciful names for the fly-agaric, of which this seems to be one. Pliny's *monocoli* is derived from the Greek *μονόκωλος*, for which 'one-sided' is given as a meaning by Liddell & Scott. A. P. Okladnikov in *Yakutia before its Incorporation into the Russian State* (McGill-Queen's University Press, 1970, p. 446) reports on the wide dissemination of tales about one-sided folk among the primitive tribes of the tundra and the northern taiga of Siberia. If I am right, we hear distant echoes of these fabulous beings, evoked by the fly-agaric working on the stone-age imagination in the Far North, in the 'Arimaspi' of Herodotus and the 'single-eye' of Soma, and also in Pliny's '*monocoli*'; and the conception finds full expression in the 'Aja Ekapād' of the Rig Veda, now solidly anchored to the fly-agaric of the taiga.

a tree that is much taller and straighter than our birches. The birch is preeminently the tree of the shaman. He builds his yurt around the bole of a birch, and in trance he climbs up the trunk to go on his travels to the land of departed spirits. The folklore of Siberia is saturated with the birch, even where the cult of the fly-agaric has been given up. Why the birch? Every student of the Siberian forest peoples has asked this question but no one seems to have found an answer. There have been a number of guesses, advanced without conviction.

For me the answer is clear. The birch is revered wherever it grows in Siberia because it is the preferred host to the fly-agaric. This mushroom grows in mycorrhizal relationship with certain trees, and the tree that it prefers is the birch. It also grows at the foot of conifers, and I hold it to be no accident that the larch occupies a place second only to the birch as a cult focus for the forest tribesmen of Siberia. The relationship between birch and fly-agaric has been known to mycologists only since 1885, but the natives of the Siberian forests have sensed it from time immemorial. If inquirers have not discovered why the birch is a cult object, I think this is because they have not asked the right questions. The natives of the Chukotka, of the Valleys of the Ob and Yenisei, have not volunteered information that they regard as self-evident: in their world, any cretin would know why the birch is venerated. As for the mycologists, who now certainly know the birch—fly-agaric relationship, they talk only to one another, and *never* to anthropologists.

Uno Holmberg in the *Mythology of All Races* has summarized for us the folk beliefs that surround the birch. The spirit of the birch is a middle-aged woman who sometimes appears from the roots or trunk of the tree in response to the prayer of her devotee. She emerges to the waist, eyes grave, locks flowing, bosom bare, breasts swelling. She offers milk to the suppliant. He drinks and his strength forthwith grows a hundred-fold. The tale, repeated in myriad variations, clearly refers to the birch and the fly-agaric, but none of Holmberg's sources have called this to his attention. What is the breast but the udder of the Rig Veda,

the swelling cap or *pileus* of the full-blown fly-agaric? In another version the tree yields 'heavenly yellow liquor'. What is this but the 'tawny yellow *pávamāna*' of the Rig Veda? Repeatedly we hear of the Food of Life, the Water of Life, the Lake of Milk that lies hidden, ready to be tapped, near the roots of the Tree of Life. There where the Tree grows is the Navel of the Earth, the Axis Mundi, the Cosmic Tree, the Pillar of the World. What is this but the Mainstay-of-the-Sky that we find in the Rig Veda? The imagery is rich in synonyms and doublets. The Pool of 'heavenly yellow liquor' is often guarded by the chthonic spirit, a Serpent, and surmounting the tree we hear of a spectacular bird, capable of soaring to the heights where the gods meet in conclave. Who is the Serpent, if not Ahi Budhnya of Vedic mythology, and what is the spectacular bird but the eagle that soars to the sky to twist the divine Soma loose and bring it down to earth?

In brief I submit that the legends of the Tree of Life and of the Marvelous Herb had their genesis in the Forest Belt of Eurasia, the Tree being the towering Siberian birch, and the Herb being the fly-agaric, Soma, the *pongo* of the Ugrian tribesmen. True, we are familiar with this legend from the cuneiform inscriptions of Sumeria and the countries lying to the west thereof. There the birch had become only a memory and it is a question how much even their most learned priests knew of the Marvelous Herb. But the legends were powerful, speaking for the power of the original Soma, and they survive in paintings, sculpture, and writings on clay. We must not forget that the Sumerians, the shadowy Subarians, the Hittites, the Mitannians, and yet others, known to us and unknown, all hailed from the North, and in their original homelands either they knew the Marvelous Herb by personal experience or their neigh-

bors knew it. They brought down with them in their baggage all the tales that they proceeded to write out in clay as soon as they had devised and mastered the art of writing. It is a mistake to attribute the genesis of these ancient tales to Mesopotamia and the Near East merely because these lands furnished the clay on which they are first inscribed. Gilgamesh, our earliest epic hero, dates from a recension written in the third millennium in Sumeria, but he was already a legendary hero then. He went out to seek the Marvelous Herb and he found it in a watery place, only to have it filched from him, as he slept, by the Serpent, its chthonic guardian—Ahi Budhnya?—more subtle than any beast of the field. The Semites at Mari and elsewhere lived in intimacy with the Sumerians and borrowed their stories, as is well known, sometimes giving the stories a new twist. In Genesis is not the Serpent the self-same chthonic spirit that we know from Siberia, Ahi Budhnya of the Aryans, and the Tree of Life, is it not the legendary Birch Tree, and the Forbidden Fruit of the Tree of Life, what else is it but the Soma, the fly-agaric, the *pongo* of the Ugrian tribesmen? The Indo-Iranians were late-comers on the stage of history, but they brought down with them the Miraculous Herb itself and they bequeathed to us the strange, the breath-taking poems known as the Rig Veda.

Hitherto the Soma-Haoma of the Indo-Iranians has been regarded as without parents or siblings. If my reconstruction of the legends holds good, the Soma of the Rig Veda becomes incorporated into the religious history of Eurasia, its parentage well established, its siblings numerous. We have here a web of interrelated beliefs that give to us a united field in a major area of primitive Eurasian religion.

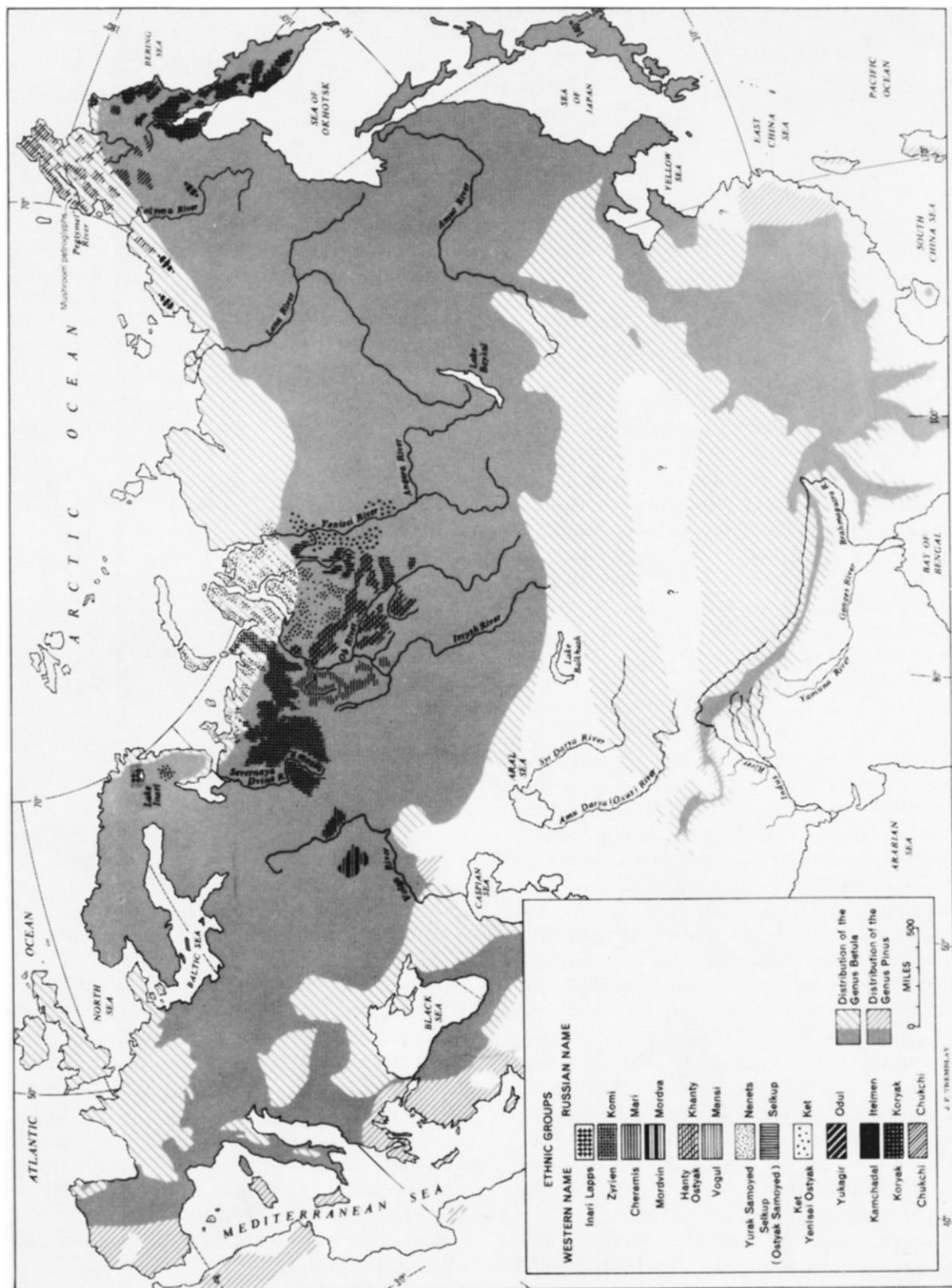


PLATE X

PERSEPHONE'S QUEST:
Entheogens
and the Origins of Religion

R. Gordon Wasson, Stella Kramrisch,
Jonathan Ott, and Carl A. P. Ruck

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CHAPTER TWO

LIGHTNINGBOLT AND MUSHROOM*

by R. Gordon Wasson

The inquirer who turns to Littré to learn about truffles, on reading the entry under *truffe*, comes upon a nugget of curious information that certainly fails to catch his attention. It seems in certain regions of France (presumably there where truffles abound) the country folk in thundery weather are wont to say, *Voilà un bon temps pour les truffes*, 'What fine weather it is for truffles!' Why in thundery weather? Not when it rains, mind you, but when it thunders. Nothing in Littré alerts the reader to the mystery that here lies hidden. The saying of these French rustics seems to be one of the surviving traces in Europe of a belief that reaches back in time deep into prehistory and in space wherever Eurasians or their descendants have lived. It is the end of Ariadne's thread that we propose to follow far and to a far-reaching end.

Pliny the Elder declared that truffles were disposed to grow in the time of autumnal rains, and above all (in the full-bodied Elizabethan translation of Philemon Holland) 'if the aire be troubled and disquieted with many thunders: during that season there will be good store of such Mushromes, &c, especially (I say) if it thunder much':

De tuberibus haec traduntur peculiariter: Cum fuerint imbres autumnales, ac tonitrua crebra, tunc nasci, & maxime e tonitribus. [Hist. Nat., Bk 19:37]

When Philemon Holland around 1600 rendered *tuberibus*, 'truffles', by 'mushromes', the word 'truffle' and the plant it represents were as yet unknown to the English-speaking world.

Juvenal wrote of the longed-for thunder in springtime [*sic*] that replenishes the table with truffles:

Post hunc tradentur tubera, si ver tunc erit et facient optata tonitrua cenas maiores.
[Satire V: 116-118]

* In 1956 I published 'Lightningbolt and Mushrooms: An Essay in Early Cultural Exploration' in a Festschrift: *For Roman Jakobson* (Mouton, The Hague) on his 60th birth-

day. It was my first paper on ethnomycology, a discipline that I founded. Here is that same paper, revised, reworked and shortened.

Strange: Juvenal speaks of tables laden with truffles in springtime, associated in men's minds as this season is with frequent thunderstorms. But in Italy truffles come in the fall and early winter until February. What was Juvenal thinking of? Was he conforming to a popular belief at the cost of doing violence to nature? Pliny had spoken of autumnal thunder-showers, adhering to the right season.

The *tuber* was an underground fungus, apparently embracing all species of both truffles and the genus *Terfezia*. The many species of *Terfezia* are often confused by travelers in the Mediterranean and Near East with truffles, but *Terfezia* and truffles, though both of course fungi, belong to different families, not merely distinct species. *Terfezia* flourish in the arid areas around the Mediterranean and eastward, and when classic writers refer to the Libyan truffles as especially good, they are speaking of *Terfezia*. In Greek the *tuber* was the *hydnon*, and Plutarch, in an essay now virtually forgotten, asked why people said thunder made the *hydnon* to grow. He asked why, not whether, the thunder made them grow, apparently accepting the fact, and he found no sure answer.¹ There was an underground fungus that the ancient Greeks called the 'lightningbolt' – *keraunion* – was it an alternative name for the *hydnon*? In Thrace *keraunion* was called the *oiton*: this word is a dialectal variant of *hydnon* and the mushroom presumably the same. Athenæus, writing in the third century after Christ, quotes Theophrastus five centuries earlier on these Thracian fungi:

Concerning these a singular fact is related, viz, that they grow when autumn rains come with severe thunderstorms; the more thundering there is, the more they grow, the presumption being that this is the more important cause. [*Deipnosophists*, Loeb translation, Bk II:62]

(Theophrastus did not make Juvenal's mistake: he adhered to *autumnal* thunderstorms.) In ancient Greece and Rome we have to do with a notion that everyone accepted, a cliché, perhaps a tiresome conversational tag. 'It's not the rain, it's the thunder that makes them grow,' people would say, just as today in summer the New Yorker insists, 'It's not the heat, it's the humidity.' Did the Greeks and Romans arrive at this belief, which for them pertained to underground fungi only, by observing nature? The answer to this question had best be deferred until we have completed our pilgrimage throughout Eurasia and the lands to which in prehistory the Eurasian tribesmen emigrated, to wit, Polynesia and the New World.

This essay on its first appearance in 1956 prompted our friend Georges

1. Plutarch's *Moralia*, *Table-talk* IV, Question 2. Loeb Classical Translations, Vol VIII, p 316ff.

Becker, gifted *savant* and humanist of the countryside of eastern France, to recall an ancient belief surviving in and around his native village of Lougres: the people there hold that *Boletus satanas* and *Boletus luridus*, as well as those other species of mushrooms that turn blue on breaking, grow where lightning has struck, around isolated trees in meadows. Furthermore, he had a friend, an aged countryman, who often gave utterance, in the patois of Lougres, to an old saw:

Lou mâ temps, c'â lou bon temps des craipâs et pe des tchampégnôs. (L'orage, c'est le bon temps pour les crapauds et les champignons.) (Thunderstorms are good weather for toads and mushrooms.)

The saying hides a pun: in the local dialect *mâ temps* means both 'bad weather' and 'thunderstorm' and therefore what is 'bad weather' for human beings is 'good weather' for toads and mushrooms.

The Piedmont in Italy is preeminent in that country for mycophilia, and immense quantities of fungi are marketed there and consumed. The towns of Alba and Cuneo are especially noted for their 'white truffles' (*tartufi bianchi*), *Tuber magnatum*. The reader will recall the classic tradition that links thunder with truffles. But in the Piedmont, strange to say, the 'thunder-mushroom', *trun*, (in Piemontese, 'thunder') is not the *tartufo bianco*. It is any market *Lactarius*, the common species being *L. sanguifluus* and *L. deliciosus*.

Among the English I have not yet found any trace of the ancient belief in a tie between mushrooms and thunder, but there is one quotation on the subject that should be carefully read. On 22 February 1774 Sir Alexander Dick, a retired physician, wrote to James Boswell a letter from which I will extract one sentence:¹

While I was at London, I alwise found plenty of Mushrooms at Covent Garden, good & reasonable during the Summer Season – this was the year 1760 and made Dr. Armstrong, quite of my opinion, who partook frequently of my Mushroom breakfasts – and as Mushrooms often arise from Lightning, when they came well dressed to table we used to stile them Ambrosia . . .

I have italicized the ending. I feel fairly confident that this reference to mushrooms and lightning goes back to ancient Greece and Rome, rather than the Anglo-Saxons or ancient Britons. Dick was the educated 18th century Englishman, thoroughly grounded in the classics. Mushrooms in his mind were linked

1. By courtesy of the Editorial Committee of the Yale Editions of the Private Papers of James Boswell, New Haven, Conn.

to lightning and ambrosia was also; whence the playful association of mushrooms and ambrosia.

From our citations we see that the linking of thunder with mushrooms is not with *all* mushrooms but only with this kind or that, and the kind changes according to the region. In the temperate zone thunder is associated primarily with spring and early summer, but truffles are a product of the fall and early winter. Of course thunder *in spring* might produce truffles *in fall*, but no where in the classic sources is such a sophisticated idea hinted at. (Later we shall see that this very belief is actually entertained by the Bedouin of the Arabian desert.) While thunderstorms of course occur at all seasons, even in mid-winter, is it not odd that in classical times people sometimes linked springtime thunder and truffles? This bad fit in the popular belief must have been what led Juvenal and a few late writers to assert that the best truffles, contrary to fact, come in the spring. For example, Franciscus Marius Grapaldus in his *De Partibus Aedium*, c 1492:

... But truffles (= *tubera*) the pigs root out of the earth with their snouts. Truffles are surrounded on all sides by earth, without roots, neither thickly growing in [one] place nor cracking out among the dry and sandy thickets. [They] are to be called certainly nothing other than flesh of the earth. *Best at spring and more often during thunder, they are said to arouse dying love.* [Book II Chap. 3, italics mine.]

Grapaldus was forcing nature into the Procrustean bed of Juvenal's text and the popular belief.

The Germanic world yields us one pleasant citation associating mushrooms with thunderstorms. The Rev. Robert B. Reeves, Jr., Chaplain of the Presbyterian Hospital in New York, wrote me 9 March 1960 these words:

In Harrisburg, Pa., where I lived from 1915 to 1923, my mother employed a Mrs. Tetzter, who was 'Pennsylvania Dutch', to bake Christmas cookies and help with the fall and spring housecleaning. She was full of country lore and would hold us children in fascination around the kitchen table or the stove, talking as she worked. One of the things she told us was that the time to gather mushrooms was after thunderstorms; that we should watch for the lightning, notice carefully where it struck, for wherever the lightning entered the ground mushrooms would spring up. These were the only kind that were fit to eat. The others, that grew without benefit of lightning, were toadstools and poisonous.

The Pennsylvania Dutch are descended largely from pioneers who hailed from the Palatinate. I have had no opportunity to take soundings there.

Many Polish and Czech friends of the recent emigration speak of a folk belief in their countries tying the growth of mushrooms to thunderstorms, but I have yet to find an informant who can pin down these beliefs in specific fashion. Similarly Ivan Sechanov, the Bulgarian mycologist specializing in the higher fungi, writes me that the Bulgarians link mushrooms with lightning, 'especially *Morchella* spp. and some others.' Probably field work in the west Slavic countries and in Bulgaria would yield more evidence than I present here.

The Great Russians, who know by cultural inheritance incomparably more about mushrooms than the classical writers did, call a particular kind of rain *gribnoj dozhd'*, 'mushroom rain'. Mushrooms, they say, come after a warm and steady and gentle rain, emphatically not the quick, violent, driving rain that we associate with thunderstorms. This 'mushroom rain' of the Russians leads to the growth of all kinds of mushrooms proper to the season, and mycologists agree with the Russians. For the Russians *gribnoj dozhd'* is a term used often to describe a particular kind of rain, even when mushrooms are not under discussion.

Roman Jakobson has drawn my attention to an obscure book by S. V. Maximov entitled *Lesnaya Glush'*, 'The Backwoods', published in St. Petersburg in 1909, in which the author dwells lovingly on the customs and beliefs that survived in the remote and impoverished village of Parfentief, some 300 miles north-east of Moscow. The villagers there were much given to mushroom-gathering and every year with the spring thaw an ancient of the village, Ivan Mikheich, would celebrate the event with a feast of morels. At that banquet without fail the host would explain, as a prelude, that the morel was good to eat only before the first thunder of spring. Thereafter, according to him, a snake would inject venom into the mushroom and cause it to rot and disappear. Only three times in his life had he heard thunder before trying out the fresh morels. . . . In the story of Ivan Mikheich the two essential elements are present, the thunder and a kind of mushroom. But here in the East Slavic world, far distant in time and space, our episode takes on a reverse twist. The morel is of course a spring-time mushroom and thereby Ivan Mikheich avoided the uncomfortable discrepancy of Juvenal and Grapaldus. But with him the role of the thunder, while it is still vital, is unfavorable to the fungi. It casts an evil spell on them, and works hand in glove with the serpent, who now enters the scene for the first time.

The late Professor Georg Morgenstierne of Oslo has pointed out to me how widespread even now is the belief in our myth on the other side of our Indo-European world. He quotes an informant in Persepolis as saying that the *dum-*

balān are thought to grow in the desert after lightning;¹ *dumbalān*, literally 'sheep's fries', is apparently the name given to an underground species of *Terfezia*.

In Tadzhikistan, around Match and in the Yaghnob Valley southeast of Samarkand, Iranian dialects are spoken that come down from the ancient Sogdian language. In those two regions the belief persists that the thunder comes when the sky-borne divinity known as *Mama*, 'Grandmother', shakes out her bloomers, and then from her bloomers lice tumble down to earth, and from the lice springs up a crop of mushrooms.² (A similar belief about the genesis of mushrooms from the shaking of old furs is reported from the neighboring Turkic peoples.) At the thunderclap the children around Match cry out: *Puri, puri, xorč, puri* being the name of a plant, an annual, whose identity we do not know, and *xorč* being the word for the mushroom. There is reason to think *xorč* is the specific name of *Pleurotus fossulatus*; if so, *puri* must be a dead umbellifer, its saprophytic host. In the Yaghnob Valley the children's cry is different: *Katta xarčak man, pullja xarčak tau*, which is to say, 'The big mushroom is mine, the little one yours.' How enigmatic and tantalizing are these odd bits of our popular belief discovered in the heart of Asia! Perhaps they will fall into place as our pattern takes shape.

In the east of the Pashto-speaking area of Afghanistan the *zmakəy gošə*, 'earth meat,' grows 'with the first roar of thunder accompanied by rain.' This mushroom is certainly a morel, called by the Uzbeks in their Turkic language *qoza-qarni*, 'baby lamb's belly,' and they too link its appearance with spring thunder and rain. In Farah, in the southwest, Pashto speakers associate thunder with a mushroom called *gobalakə*, whose identity I do not know but by the description given me think it is *Phellorina* sp. At Bagramatal, a town in the northeast of Afghanistan, in the Hindu Kush where they speak the ancient Katei language, an informant told us of a mushroom, *gokluk*, that he said was produced in spring by thunder. He drew it and his drawing strongly suggested *Coprinus comatus*.³

1. BSOAS, 1957, xx, p. 453. I take this opportunity to express my gratitude to Professor Morgenstierne for his help and counsel throughout my inquiries. His specific help mentioned in divers places in this paper does not begin to repay my indebtedness to this great scholar.

2. The Tadzhik and Yaghnob references appear in M. S. Andreev's 'Po Etnografii Tadzhikov,' a contribution in *Tadzhikistan, sbornik statej*, a volume edited by N. L. Korzhenevskij

and published in Tashkent (1925), pp 172-3, which we consulted. Heinrich F. J. Junker uses the material in *Arische Forschungen: Yaghnobi-Studien*, I, p. 106 (= *Abhandlungen d. philol.-hist. Klasse d. sächsischen Akademie d. Wissenschaften*, Band xli, No. 2, Leipzig, 1930.)

3. For the Afghan fungal vocabulary I am indebted to M. Ch. M. Kieffer, the Alsatian specialist in the Afghan languages, for an invaluable 26 page memorandum prepared on my instigation in March 1965.

In Kashmir certain edible gilled mushrooms known in Kashmiri as *hēḍur* and *hēṇḍa* are supposed to emerge after thunder, but this belief attaches above all to the morel, called locally *kana-gūch*, 'ear-mushroom'. The Kashmiri do not go out looking for morels until there has been thunder. They are clear about this, and also that the morels are powerful aphrodisiacs, to be eaten at weddings, if you can afford them. I gathered this information from Kashmiri informants when I was in Śrinagar in April 1965. Even more interesting are the verses in the Sanskrit lyric *Meghadūta*, 'The Cloud-Messenger', composed c AD 400 by Kālidāsa. In verse 11 the exiled *yaksha* or demigod addresses the raincloud drifting northward over India: 'When they eagerly hear thy sweet-sounding, fertilizing thunder, which can cover the earth with mushrooms . . . !' The *thunder* covers the earth with *mushrooms*! In the heart of this mycophobic Hindu people we find an outstanding poet giving voice to the same notion that we find elsewhere. But he does not suggest that the *mushrooms* replenish the tables: for upper caste Hindus, mushrooms are tabu. Here 'mushroom' is *śilindhra*, a puzzling word of odd aspect that Professor Morgenstierne thinks was probably borrowed from some pre-Sanskrit language of India. From a variant of the poem it is clear that a mushroom with pileus was meant, and one lexicographer says that this mushroom was linked with cow-dung: these hints may point toward *Stropharia cubensis*. The ending *-dhra* could mean 'carrying' and *śili-*, a rare and doubtful word, might mean a worm or a female toad. Such clues, having little weight by themselves, may become clothed with meaning in the context of other evidence. We recall that in India Hindus of the three upper castes are forbidden by their religion to eat mushrooms of any kind.

Now let us look beyond the confines of the Indo-European world.

In a personal letter to me dated 27 May 1950, Colonel H. R. P. Dickson, author of *The Arab of the Desert* and an outstanding authority on the life of the Bedouin, confirmed that the Bedouin are great lovers of *Terfezia*. He said that in the season of the *wasm* (October to early November) they look for heavy rains accompanied by *thunder and lightning*, and if the weather is propitious then, they know that some months later, in February and March, *Terfezia* will abound, and when the days are fulfilled, then the black-tent folk strike their tents and make their way across the desert to the places where grows the rug-rug bush, known to botanists as *Helianthemum Lippi*, for the *Terfezia* thrive close by this plant. Then at dawn and dusk, by the horizontal rays of the sun, the women and children and shepherds detect the shadows cast by the slight monticules caused by the swelling underground fungi, and gather them, and every-

one feasts on them. . . . There is a metaphorical expression for a fungus found in a dictionary of classical Arabic,



BANĀT^wR-RA'D', 'the Daughters of Thunder', but we are left in the dark as to the species so designated. It might be a name for the *Terfezia* that Dickson speaks of.

In India around Mysore, in Dravidian country, the thunder is said to be linked to the appearance of species of the genus *Phallus*. In the Northeast of India the Santal, an aboriginal tribe living on the western fringes of West Bengal, in eastern Bihar and in northern Orissa, call certain mushrooms *putka*, and the mushrooms so named grow always after thunder: so the Santal tell us. The mushrooms called *putka* are a *Scleroderma*, and also a false *putka* that is a puff-ball.

In Tibet by far the most popular mushroom is the *ser sha*, 'yellow flesh'; it is reputed to grow after thunderstorms. Despite our strenuous efforts we have failed to obtain a specimen of this mushroom and it remains unidentified. A painting of this mushroom in the Kew mycological collection was repudiated emphatically by my Tibetan friends in India.

Now let us turn to the Chinese. There came into my possession in 1951 a copy of a handwritten work in eight volumes on ethnomycology entitled in Japanese *The History of Mushrooms*, dated 1811 and composed by Karashi Masujima, who wrote under the pen names of Ranen, 'orchid garden', and Gushá, 'the fool.' (In choosing his field of research he preceded the Wassons by a century and a half!) He was a Japanese scholar teaching in Yedo at the school for samurai called Shoheiko. In this book are discussions of three kinds of Chinese mushrooms linked with thunder by the people of Suzhou and the Province of Juangzhou:

雷驚蕈

leijing xun

Thunder-aroused Mushroom

雷聲菌

leisheng jun

Thunderbolt Mushroom

雷菌

lei jun

Thunder Mushroom

The description of these mushrooms is insufficient for identification, but they all grow above ground. The three names may be variants for a single species. There is no reason to suppose that the thunder myth was confined to Suzhou

and Juangzhou Province. When I was in Taiwan and Hong Kong in 1964-1966 the thunder association was commonly attributed to species of *Termitomyces*, a delectable table mushroom. The late Professor Roger Heim, the famous French mycologist and a gastronome, ranked them first among the edible mushrooms of the world. In the Philippines the mycologist José Miguel Mendoza reports in his *Philippine Mushrooms*¹ the common native belief throughout the islands that thunder and lightning cause the generation of mushrooms, and in the spring of the year, when people hear the thunder roll, they rush into the fields to gather the edible kinds. In the Pampango tongue, spoken in central Luzon, *Termitomyces albuminosus* (Berk.) Heim (formerly *Collybia albuminosa*) is called *payungpayungan kulog*, where the first element means 'parasol-like' and *kulog* is the word for thunder in both Tagalog and Pampango. This undoubtedly reflects the native belief to which Mendoza refers. I am told that the same association with thunder exists in Kyushu and the Ryu Kyu islands. The termites build their nests there and the farmers rate the termite-mushrooms highly. These offshore manifestations might easily mark the spread of a Chinese concept.

The thunder association of particular species of mushrooms runs all through the mycological writings of the Chinese. It seems to be more prevalent there than anywhere else. The sclerotia of *Omphalia lapidescens* Berk., which grow in Southern China as pellets of little balls on the roots of bamboo trees, are called 'thunder-balls' 雷丸, *lei wan* in Chinese or *raigan* in Japanese, and they were esteemed in Chinese medicine. The knowing-ones must have believed them to be aphrodisiacs. These balls were so highly regarded that the Japanese emperor Shōmu in the middle of the 8th century, when he and later his widow Kōmyō created the Shōsōin Temple in Nara, depositing in it all the treasures that he most prized, included in the collection some of these sclerotia.² At that time the Japanese Court was under strong Chinese influence and the 'thunder-balls' had probably been imported from Southern China. In China the famous *ling zhi* 靈芝, 'divine mushroom of immortality', has occasionally been called the *lei zhi* 雷芝, 'thunder zhi'.³ In that idyllic text, *The Mushrooms of Wu*,

1. Published in *The Philippine Journal of Science*, LXV, Jan.-April 1938.

2. At the end of the second World War in the wake of the Japanese defeat these treasures were opened for inspection, and a few of the 'thunder-balls' were shown to a leading Japanese mycologist, Yoshio Kobayashi, on the staff

of the Ueno National Science Museum. He confirmed their identity, twelve centuries after they had been deposited.

3. The Chinese *ling zhi* has been identified as *Ganoderma lucidum* by two Japanese mycologists, Iwao Hino in 1937 and Rokuya Imazeki in 1939. See *Transactions of the Asiatic Soc. of*

吴葷譜 *Wuxun pu* written by Wu Lin 吴林 shortly after 1662 and published in 1703, in which the author dilates with love on the rich mushroom life of the countryside around his native village of Wu, the beneficial effect of thunder on certain mushrooms figures conspicuously. Let it be noted that in China, as well as elsewhere, the role of thunder always applies to particular species, never to the fungal world as a whole.

Now we shall shift the scene to Madagascar, where the indigenous cultures are dominantly Malayo-Indonesian, Professor Heim has reported an extraordinary practice of the Tanala people there.¹ They dry and convert to powder the giant sclerotium (known to mycologists as *Pachyma cocos*) of the mushroom *Lentinus tuber regium* Fries, on which the Tanala people bestow the name *olatafa*. Then when a thunderstorm of fearful violence breaks, the natives quickly put some of the powder moistened with water into their mouths, and as the lightningbolt streaks by, they spit forth the fungal paste into the teeth of the storm crying *Fotaka!* or else *Fotaka malemy!*, which is to say, 'Earth!' or 'Soft Earth!' The word *olatafa* appears to be related to *tafa*, meaning 'unbalanced' – a startling association of ideas, as we shall soon see. Professor Heim goes on to say that neighbors of the Tanala people in Madagascar – the Betsimisarakas, the Antimoros, and the Tsimihety – also make use of the *Lentinus tuber regium* to protect themselves against the fury of lightning, but they merely spread around them, on the ground, the dried powder of the sclerotium at the moment when the thunderstorm develops a frightening intensity. These three peoples like the Tanala speak languages of the Malayo-Indonesian family. Recent linguistic studies have indicated that they broke away from their kin in Southeast Asia before the Hindu influence made itself fully felt there, certainly before the 4th century AD,² perhaps much earlier.

The Maoris of New Zealand, pure Polynesians, possess the thunder link with mushrooms. In the Maori language *whatitiri* means 'thunder'. *Whatitiri* is a female ancestor of the Maori race. Her son (or grandson) Tawhiki was linked with lightning, which flashed from his armpits. In 1963, when I was in New Zealand, Kiri Maniapoto, a Maori woman of Rotorua, told me (and I paraphrase

Japan, 3rd series Vol. 11, 'Mushrooms and Japanese Culture', by R. G. Wasson, p 10; 'Japanese Mushroom Names', by Rokuya Imazeki, p. 40.

1. 'L'Olatafa', by Roger Heim, published in the *Archives du Muséum National d'Histoire Naturelle*, Volume du Tricentenaire, 6^e Serie, Tome XII, 1935.

2. S. Thierry: 'A propos des emprunts sanskrits en malgache', *Journal Asiatique*, Paris, 1959, pp 311-348; Louis Molet: 'L'Origine des Malgaches', *Civilisation Malgache*, Tananarive, 1964, Série Sciences Humaines No. 1, Faculté des Lettres et Sciences Humaines, Université de Madagascar.

what she said) that when it thunders, the Spirits are defecating, and the turd falling to earth is the *tutae whatitiri*, the fungus ball that quickly expands into the strange, the astonishing, net- or basket-fungus common in New Zealand and called by mycologists the *Clathrus cibarius* (Tul.) Fischer. *Tutae* means 'faeces'.

★

In the course of my inquiries I have found only one chlorophyll-bearing plant linked to thunder or lightning: the mistletoe, – like the mushrooms, linked with religion.

My survey of the evidence is certainly not exhaustive. It comprises the documentation gathered intermittently by one man over a few decades. There must be many variants that I have missed. I have dealt only with the peoples of Eurasia and their offspring, the Polynesians. In black Africa I have taken soundings among the Baganda of Uganda, the Ibo and Hausa, and Fulani (= Peul) peoples. The results were wholly negative. If this prove true of all the peoples of black Africa, it would localize the origin of the myth in Eurasia. The Kumá people in the Wahgi Valley in the center of New Guinea know nothing of a fungus-thunder tie, though their empirical knowledge of the higher fungi is impressive.

An intelligent observer in Eurasia familiar only with the folk beliefs of his own area might naturally conclude that the local notion linking thunder with a particular species of mushroom derived from a subtle observation of nature on the part of his countrymen. But faced with the diversity of beliefs in various parts of the Eurasian world, he would have to pause and admit that the natural causes must be remote and involved. He would observe that except in two or three places such as Madagascar and the Maoris of New Zealand, the survivals are mere verbal fossils: nothing is left of them save a phrase repeated out of habit, thoughtlessly.

Our survey of the fossilized myth shows that in different regions it is linked with species of some fifteen genera:

<i>Boletus</i>	<i>Omphalia</i>	<i>Tuber</i> (This includes the black truffle of
<i>Clathrus</i>	<i>Phallus</i>	Périgord and the truffle esteemed
<i>Coprinus</i>	<i>Phellorina</i>	by the Romans, perhaps the <i>tartufo</i>
<i>Lactarius</i>	<i>Pleurotus</i>	<i>bianco</i> of contemporary Italy.)
<i>Lentinus</i>	<i>Terfezia</i>	<i>Scleroderma</i> { thunder-engendered
<i>Morchella</i>	<i>Termitomyces</i>	<i>Lycoperdon</i> { mushrooms called <i>putka</i>
		among the Santal of India

and the genus represented by the unidentified Tibetan *ser sha*. The species include inedible (eg, *Phallus*, *Clathrus*) as well as edible kinds, and the myths show a wide variety in the details of the folk beliefs, the most elaborate of the myths being found among the Tadzhiks, the Tanala of Madagascar, and the Maori of New Zealand.

In every instance there is one common denominator: the link between a designated species of mushroom and the thunderbolt.

Of a belief associating mushrooms generally, regardless of species, to thunderstorms, we have found evidence in only two regions, both in Europe. In France, apart from the specific associations that I have already noted, belief in the favorable influence of thunder showers on the growth of mushrooms is widespread, as it seems also to be in Poland and Bohemia. Further inquiry on the ground would probably bring out added details corresponding to those we have found elsewhere. In the temperate zone thunder and lightning come mostly in spring and early summer though not exclusively, and mushrooms in late August and September, and the mythic belief makes no effort to reconcile this contradiction.

As for the mycologists, when confronted with the many faces of this belief, they offer no help in explaining them.

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Ethnomycology: Discoveries About *Amanita muscaria* Point to Fresh Perspectives

R. GORDON WASSON

In the 1970s there have been two major discoveries in ethnomycology involving the psychoactive mushroom *Amanita muscaria*.

The Discoveries

The first major discovery was made by Carl A. P. Ruck, outstanding classical scholar of Boston University, who showed that soma, the long-mysterious plant permeating the *Rig Veda* (one of four sacred writings in Hinduism), was known to the ancient Greeks and may well have been consumed ceremonially on the island of Delos, the plants coming from the far north, probably in Asia (Wasson et al. 1978, 1986).

In regions where there is a mushroom cult, it is the invariable custom among local believers not to consider the sacred mushroom as a mushroom. Instead, it may have a distinctive name, like soma, and is set apart from all other mushrooms in the thoughts and feelings of the people. Thus, among the Greeks, as well as among the Aryans of the Indus Valley, the words designating the holy mushroom occur seldom, being subject to a religious taboo. It would be a mistake, however, to assume the Greeks borrowed their terms for the holy mushroom from the Aryans. Both groups drew their manner of referring to it from their ancestors, from a common fund of ideas that expressed the thoughts of humankind about the miraculous fungus, the entheogen,¹ on which they had focused their adoration from far, far back.

Perhaps from the dawn of the human race the supernal plant had been linked with the lightning bolt. According to the *Rig Veda* (IX 82.3, 83.3) nothing less than the lightning bolt with its accompanying ear-splitting thunder inseminated the rain-softened earth at the base of the Tree of Life with the miraculous plant, whose paternity was confirmed in the marvelous red garb with which it came into existence, set off by patches of a virgin white veil with which it was born.

One of the words in Greek originally designating soma is *cyclops*, "single eye," referring to a race of one-eyed giants that played a vigorous role in Greek mythology. In *Soma*

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(Wasson 1967), I assembled passages from the *Rig Veda* that spoke of soma as a single eye and pointed out how appropriately this mushroom could be spoken of as a single eye, showing a photograph of *Amanita muscaria*. This figure of speech could conceivably have been taken by the Greeks from Aryans in the Indus Valley, but it is far more likely the Greeks brought it down from Asia whence they emigrated in the second millennium B.C.

A second concept that finds expression in Greek literature is "one-leg," "shade-foot," or "cover-foot." Soma was the only divinity known to early humans that grew a single "leg," the stipe, and this singularity impressed itself forcefully on the imagination of the adorers.

The third figure in Greek literature is "tongue-in-belly": the divinity soma had only his torso to live in—no arms, head, neck, eyes, nose, mouth, or ears. These organs must therefore reside in the torso, the pileus of the mushroom. Ruck provided us with the Greek effigies of this figure and also citations of Iambe-Baubo in the *Homeric Hymn to Demeter* (Wasson et al. 1978, lines 203–205), where we are told that he/she played a minor role in the Eleusinian rites.

The Greeks, Aryans, and other Asiatic peoples strove to reconcile the mushroom shape of *Amanita muscaria* with a divine being! The Greek efforts were repeated in Pliny the Elder's *Historia Naturalis*, a text that was certainly responsible for the reappearance of the mushroom/divine being in manuscripts of the high Middle Ages and in the early generations of printed books, when the vogue for monsters living beyond the limits of the known world was fashionable science fiction. Until Ruck's discovery, however, no one had known what those bizarre figures meant.

The second major discovery in ethnomycology was made by Bernard Lowy (1974), retired professor of mycology at Louisiana State University, who explored the Maya world in Guatemala. Knowing the emphasis I placed on the words for *lightning bolt* in the study of ethnomycology, Lowy learned those words and other thunderstorm vocabulary in two Mayan languages—Quiche and Tzutuhil. He then explored the mountains adjacent to the Quiche town of Chichicastenango, found specimens of the scarlet variety of *Amanita muscaria*, and returned to Chichicastenango's marketplace, where mushroom vendors immediately identified Lowy's specimens as *kakuljá*, the precise word that is used in Quiche for a blinding flash of lightning followed by a deafening clap of thunder.²

The identity of one word for lightning bolt and *Amanita muscaria* in Quiche is breathtaking. For almost fifty years I had been pursuing the link between the two, and finally Lowy found it preserved in the Quiche highlands of Guatemala in its pristine freshness. The Maya must have brought the lightning bolt meaning from Asia and used the same word as a most powerful trope for *A. muscaria*.

Fresh Perspectives

What are the implications of these two discoveries for future study in ethnomycology? Several areas are indicated.

NEW TRANSLATION OF THE *POPOL VUH*

A long poem in Quiche, running to 8544 lines in Edmonson's English translation, survives to this day, having been preserved by human memory for untold millennia until a respected Quiche wrote it out in the middle of the sixteenth century. Called *Popol Vuh*, this poem is a kind of *Book of Genesis*. In it, the word *kakuljá* had been translated,³ until now, in its primary sense—lightning or lightning bolt. Yet the word is obviously used in the poem in its secondary sense—*Amanita muscaria*, the mighty entheogen.

This entheogen is also called *hurakan*, "one-leg," in the *Popol Vuh*, or *ekapād*, "single foot," in the *Rig Veda*. In the Vedic texts, the latter term is coupled with the epithet *aja* in the phrase *aja ekapād*, "not-born single foot." Vedic exegetes have astutely arrived at the meaning of the Sanskrit *aja*, "not born," a name given to the mushroom because it has no visible seed, as do seed-bearing plants and animals, and because in that prehistoric age it was believed the entheogen was miraculously conceived in the rain-softened earth by the single lightning bolt of Indra. What these scholars failed to see was that soma was a cryptogram pointing to the holy plant *Amanita muscaria*, the spores of which were invisible to the Brahmans.

The great Vedist Louis Renou once wrote that all the themes of the *Rig Veda* are summed up *in nuce* in the single word *soma*; such was this entheogen's all-pervading influence on the Aryan Brahmans. Renou's utterance concerning soma is equally true for *kakuljā* in the *Popol Vuh*:⁴ all the Quiche poem's problems are summed up in the words *kakuljā hurakan*, referring to *Amanita muscaria* one-leg. The *Popol Vuh*, however, shows also the influence of the New World; while *A. muscaria* is still the number-one entheogen and is expressly given this honor when it is first introduced, there are two other categories of entheogens: (1) *ch'ipi* or "dwarf" *kakuljā*, the various entheogenic *Psilocybe* species that today are used in many parts of Mesoamerica, and (2) *raxi* or "green" *kakuljā*, the various phanerogamic entheogens that have been discovered by Mesoamericans (e.g., the two species of morning glory seeds and the peyote cactus in northern Mexico). The *Popol Vuh* cites these three classes of entheogens periodically with formality, but *hurakan* enjoys the distinction of being cited a half dozen times by itself. Now that we see the vital role entheogens play in the *Popol Vuh*, perhaps we are taking our first big step in understanding this complex poem.⁵ Someone with a real knowledge of Quiche Maya and a sense of poetry should give us a good translation of the *Popol Vuh* that considers the botanic meaning of *kakuljā*.

I have a personal reason for delight at Ruck's and Lowy's discoveries: though my wife and I felt we were on the track of something important, it is gratifying to see our view confirmed by scholars who have embarked on our subject with success. The mighty entheogen of the Old World was *Amanita muscaria*, and this entheogen underlines not only the *Rig Veda* but also, half-way around the world, inspires a second body of prehistoric verse, the Quiche *Popol Vuh*. The identical visceral reaction from the entheogen expresses itself not only in Quiche in the powerful metaphor "lightning bolt" and in its second name "one-lég" but also in the *Rig Veda* as "single-foot." These figures go back far, perhaps to the dawn of the human race. In the Hellenic tradition of the soma surrogates and even in medieval manuscripts we see the one-leg figure, whose meaning no one knew for centuries.

I must add a note on a basic difference in the emphasis given to the parallels between the *Rig Veda* and the *Popol Vuh*. The Hindu writing (RV IX 82.3) says that Parjanya, the god of thunder, was the father of soma, and that the gods, "those fathers with a commanding glance, laid the Somic germ" (RV IX 92.3). All 1028 hymns in the *Rig Veda* deal directly or indirectly with the provenance of soma, and no alternative or conflicting explanation is given. Is it not a little odd that the Vedic poets do not say more about the origins of soma?

Again, the phrase *aja ekapād*, "not born single-foot," occurs six times in the *Rig Veda* but all in a small body of hymns to the divinities known as the Vi'svadevas. These passages sound like archaic survivals. By contrast, in the *Popol Vuh*, the lightning bolt and accompanying thunder are repeated loud and clear at intervals, sounding like a living belief. In the New World, time marched on more slowly than in the Old, although in both the *Rig Veda* and the *Popol Vuh* we are confronting a prehistoric age.

IDENTIFICATION OF THE TREE OF LIFE

Through the centuries we have heard references to the Tree of Life, the World Tree, the Tree of the Knowledge of Good and Evil, and perhaps other names, always pointing to a tree that is revered as holy, the focus of the religious feeling of the people thereabouts. The tree is never concealed, but it is a pity that seldom has the genus or species of tree been noted. I now make bold to suggest that it is always the mycorrhizal host of *Amanita muscaria*. The "fruit" of that tree is subject to taboo, spoken about only one-to-one, most frequently in the evening by candlelight; it is never mentioned in the marketplace or in mixed company. We must assemble all references to this tree and prepare a map showing where it has been worshipped and by whom. Does the religion of that tree still survive?

IDENTIFICATION OF THE ONE-SIDED FIGURE

Rodney Needham (1980) of All Souls, Oxford, has published a significant essay on the "one-sided man" in prehistory. Needham calls the drawing of this man the "unilateral figure," a man with a single leg, a single arm, a single eye—in short, a monster. Although Needham never mentions the entheogen, it is clear to me that the unilateral figure stands for the entheogen from earliest times. Someone should check the sources Needham gives in his bibliography to see how far they go in consolidating this thesis. To the extent these sources confirm this hypothesis, they expand the use of *Amanita muscaria* in humankind's past, perhaps vastly.

USE OF *AMANITA MUSCARIA* AMONG PALEOSIBERIAN PEOPLES

Unfortunately, in the West we do not know what Russian scholars have done on the study of the *Amanita muscaria* religion among the northern tribes of Siberia and also perhaps in Europe. Toporov, a leading Indo-Europeanist in the world, published a major treatise in Russian in 1985. Since my digest in *Soma* (Wasson 1967) of what the eighteenth- and nineteenth-century writers said about the mushroom cult in Siberia, we have heard little.

Someone (Toporov?) should inspire a concerted effort to capture the recollections of the former practices among the Paleosiberian tribes, especially all the taboo words for *Amanita muscaria* and the practices attending the ritual eating of it. Similar studies should be done for the other peoples who consumed the spectacular mushroom—the Samoyeds, the Finns, and the Ob-Ugrians. Also, among the Finns, it would be worthwhile to learn whether the various documents used in compiling the *Kalevala* included references to *A. muscaria*. It might be that nineteenth-century editors thought readers would be offended by such texts and perhaps they themselves did not understand the texts. The Lapps, especially the Inari Lapps, should be questioned about their use of *A. muscaria*.

MUSHROOM ARTIFACTS IN LATIN AMERICA

Of course, there remains much work to be done in southern Mexico. I hope my observations there will prompt others to inquire discreetly in places that I have not visited, as well as in places where I made observations. In the Quiche area of the highlands of Guatemala, every linguistic group should be explored, tactfully and carefully, to learn whether there are memories of use of *Amanita muscaria*, *ch'ipi kakuljá*, and *raxi kakuljá*.

Certainly Colombia should be included in the field. Work should start seriously in the Museo del Oro. Since the authorities are naturally and rightly alert to the possibilities of theft in the Museo del Oro, anyone who goes down there should be well introduced. Armed, for example, with a letter from Professor Richard Evans Schultes, a member of the

museum's staff, an investigator should photograph every artifact suggestive of mushrooms, even though repetitive. The following data should be attached to each photograph: the date the museum obtained the artifact, who found the artifact and where, which Indians lived in the area, and, if that group still lives there, whether individuals can be questioned tactfully and by whom. A mine of data about the use of the fungal entheogen remains to be discovered in Colombia, and perhaps also in the Museo de Lima, Peru.

MYCOPHOBIA IN ENGLISH SPEAKERS

A final area for future research in ethnomycology relates to the English-speaking world. In Chapter 2 of *Mushrooms, Russia and History* (Wasson and Wasson 1957), Valentina Pavlovna and I tracked down in detail the mycophobia that has marked English herbals through the centuries. We also pointed to pertinent passages in the works of poets, playwrights, and prose writers. In dramatic contrast with the Russians, English-speaking people have been mycophobes. I will not repeat the material here but will continue the inquiry further.

The mushroom manuals published in increasing numbers from the mid-nineteenth century were written by amateur and professional mycologists to help beginners identify mushrooms in the field. These manuals grossly exaggerated the perils of eating *Amanita muscaria*; a goodly number of them even led readers to believe that those who ate this mushroom risked death. This is not a scientific finding but rather a deep-seated prejudice, a folk belief from long, long ago.

Let us suppose that a small child has nibbled a red mushroom (in North America, perhaps a yellow one) with white spots. When the parents learn of that fact, they take alarm, whisking off the child to the hospital where the doctor orders a stomach pump applied to the child, who is probably kept in the hospital overnight. The child is discharged the next morning, saved! The doctor modestly and silently accepts the parents' heartfelt expressions of gratitude for "curing" the child. How often do we read such accounts in small-town newspapers with limited circulation! If the child eats green apples and gets sick, we never hear of it, yet the sickness from *Amanita muscaria* is no more serious.

Camille Fauvel, a retired French policeman who in the First World War had been in charge of the Mata Hari portfolio, was a formidable mycophage. When living in Gascony he ate vast quantities of *Amanita muscaria* because he enjoyed the taste. Locally the plant was called *crapaudin*, "toad mushroom," but city folk called it *tue-mouche*, a translation from the German name, or *fausse orange*. These ugly neologisms of the nineteenth century are nothing more than the invention of city folk who are unfamiliar with local words and go outside the country for another name.

The false belief in the toxicity of *Amanita muscaria* must go back for thousands of years. Dorothy Sayers, an excellent and conscientious writer of mystery stories, used this mushroom in *The Documents in the Case*. Involving herself in a complicated entanglement based on muscarine, a poisonous alkaloid that exists in *A. muscaria* but only in trace amounts, Sayers had her villain administer the "lethal" mushroom to the victim. When Sayers discovered her mistake, she apologized publicly in an article in *The Listener* in 1931.

The deep-seated prejudice against *Amanita muscaria* has affected our vocabulary. Although a common mushroom, it has no name in English.⁶ To speak of it, one must be familiar with the Linnean binomial. Its original name must have been *toadstool*, but because a taboo lay on *A. muscaria*, the name came to mean any mushroom that is not recognized; and since most people recognize no wild mushrooms, toadstool became the name of all of them.

Anglo-Saxon discrimination against this particular mushroom extends further and may be responsible for the poverty of the English language when it comes to expressing

the blinding and ear-splitting lightning flash that (as was once believed) marked the conception of the mighty entheogen in the rain-soaked earth. Yet other languages have words for the two categories of lightning bolts:

ENGLISH	FRENCH	SPANISH	QUICHE MAYA
Lightning	Éclair	Relámpago	Xkoyopá
—	Foudre	Rayo	Kakuljá

Has no one ever called attention to this shortcoming of the English language? What brought it about? Is it possible the lack of a common word for *Amanita muscaria* gives us a clue? Has the deep-rooted fear of the rejected belief in the divine *coup de foudre*,⁷ as the inseminator of our entheogen, driven the word for the blinding and deafening flash of lightning from our language? If I were younger, I should test this hypothesis by polling the Indo-European languages to see how the presence or absence of this word can be correlated with mycophobia and mycophilia.

NOTES

¹The word *entheogen* signifies a plant that was and/or is being served in holy agapes and that affords the celebrants what they consider supernatural insights.

²Lowy's discovery was confirmed in the field by Dennis Tedlock (1985).

³Prior to Tedlock's translation in 1985, there have been twelve translations of the *Popol Vuh* into Spanish, English, French, German, and Russian.

⁴Renou died before it was learned that soma was the same plant called *kakuljá* by the Quiche Maya.

⁵Although Tedlock knew of Lowy's discovery in 1985, in his translation of the *Popol Vuh* he rendered *ch'ipi kakuljá* as "newborn thunderbolt" and *raxi kakuljá* as "raw thunderbolt." Both of these phrases make perfect nonsense, and I rather doubt lightning is even mentioned in the *Popol Vuh*.

⁶In *Soma* (Wasson 1967) I tried out a name for it, fly-agaric, but this name has not taken hold.

⁷Do Christians not perceive in the Annunciation a reappearance in new habiliments of the age-old belief? In many old paintings (and perhaps prints) of the Virgin receiving the wonderful news from an angel of Jehovah, there is at the same moment a visible ray from heaven that comes down and enters the Virgin. That ray discharges in the New Incarnation the duty of the *coup de foudre* in the Old.

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THE LAST MEAL OF THE BUDDHA

R. GORDON WASSON

I. WHAT WAS SŪKARA-MADDAVA?

UPWARDS OF A DOZEN SCHOLARS¹ in the past century have commented on what the Buddha ate at his Last

¹ 1896 and earlier. Karl Eugen Neumann: *Die Reden Gotamo Buddho's aus des Mittleren Sammlung Majjhimanikāyo des Pāli-Kanons*, Leipzig, 1896, pp. xix–xxii. Neumann cites earlier writers: Friedrich Zimmermann, who in turn refers to an article in the *Journal of the Maha-Bodhi Society*, Vol. 1, No. viii, pp. 2–3, Calcutta, 1892, wherein the editor of this *Journal* reproduces statements by “Rhys Davids, Bigandet, Rockhill, and Colonel Olcott,” laying stress on the proper meaning of *sūkara-maddava*. We have seen none of these earlier discussions.

1910. T. W. and C. A. F. Rhys Davids, and later editions. *Dialogues of the Buddha: Part II*. Translated from the Pāli of the *Dīgha Nikāya* by T. W. and C. A. F. Rhys Davids. One of the series of the Sacred Books of the Buddhists. Published for the Pāli Text Society by Luzac, London. (All of our quotations from the *Dīgha Nikāya* are from the 1959 edition.)

1916. Coomaraswamy, Ananda K.: *Buddha and the Gospel of Buddhism*, p. 79, George G. Harrap, London.

1931–2. Arthur Waley. “Did Buddha die of eating pork?” *Mélanges chinois et bouddhiques*, Vol. 1, pp. 343–354. Brussels.

1942. Fa Chow. “Sūkara-maddava and the Buddha's Death.” *Annals of the Bhandarkar Oriental Research Institute*. Edited by R. N. Dandekar, pp. 127–133.

1948. E. Waldschmidt. *Beiträge zur Textgeschichte des Mahāparinirvāṇasūtra*, pp. 63–85: “Die Letzte Mahlzeit des Buddha.”

1948. E. J. Thomas. *Indian Culture*, XV, pp. 1–3: “Buddha's Last Meal.”

1949. A. Foucher. *La Vie du Bouddha*. Paris, Payot, pp. 304–308: “Le Dernier repas à Pāvā.”

1968. André Bareau. “La Nourriture offerte au Buddha lors de son dernier repas,” *Mélanges d'Indianisme*, Paris, Editions E. de Boccard, pp. 61–71.

1970. André Bareau. *Recherches sur la biographie du Buddha*. Tome I. Notably Chapter VII 8 & 9, pp. 251–281. Paris. Ecole Française d'Extrême-Orient, Vol. LXXVII.

Meal, ca. B.C. 483, and the puzzling mystifications in the evidence. The meal was served to him and his suite of monks by his host the metal-worker Cunda at Pāvā, a village that lay near Kusinārā where the Mahāparinirvāṇa—the “Great Decease” as the Rhys Davidses translated it—was scheduled to take place some hours later. The canonical Pāli Text says that Cunda served his august guest *sūkara-maddava*, a hapax in Pāli. Walpola Rāhula, the Buddhist monk and scholar residing in the West, has assembled in a memorandum for us the relevant Pāli texts with his translations and notes, and this document is appended to our paper.

The first part of that compound word, *sūkara-*, is simple: “pertaining to swine,” *sūk-* being cognate with Latin *sus*. The second element is generally thought to mean tidbits, dainties, but whether as a specially delicate part of the pig's meat or as a food of which swine were specially fond, whether a subjective or objective genitive, no one can say. Rhys Davids, noticing that in Bihar there was a common edible underground fungus, translated *sūkara-maddava* by “truffles.”² This was a successful pitch, considering that by “truffles” he meant an underground fungus common thereabouts, although no truffle (= *Tuber*) has been discovered so far in Bihar. His underground fungus was a *Scleroderma*, a little snow-white ball that is gathered just as soon as it appears on the surface. There are a number of genera of underground fungi of which truffles are one, and each genus has many species.

The two canonical Pāli Commentaries discuss but do not agree on the meaning to give to *sūkara-maddava*. One of them is the canonical Pāli Commentary on the *Dīgha Nikāya*, *Sumaṅgalavilāsiṇi*, and the other, the *Paramatthajotikā*, the canonical Commentary on the *Udāna*. These Commentaries took their

1970. P. Demiéville. Review of R. Gordon Wasson: *SOMA: Divine Mushroom of Immortality*. *T'oung Pao*, LVI: Livr. 4–5, pp. 298–302. E. J. Brill, Leiden.

This list does not pretend to be exhaustive.

² See note 1, entry under 1910, p. 137 fnnt.

present form in Pāli under the guidance of the celebrated monk Buddhaghosa early in the fifth century of our era, mostly from Sinhala sources available to him. Each of these commentaries suggests various dishes as possibilities. Both include pork and an "elixir" (a chemical preparation) in the list of choices. The canonical Pāli Commentary on the *Dīgha Nikāya* adds soft rice with the broth of the five products of the cow. The canonical Pāli Commentary on the *Udāna*, deriving its authority from the Great Commentary (now lost) that dates from the third century B.C., offers two further choices: bamboo shoots (sprouts) trodden by pigs, and mushrooms grown on a spot trodden by pigs.

That the Buddha was eating his last meal was known to everyone thereabouts: nothing that happened there could have escaped those within eye-reach nor have been forgotten by them, not least because of the awesome event to take place a few hours later, the Buddha's translation to Nirvana that he had been predicting for that night since he was in Vaiśālī three months before.

Dr. Stella Kramrisch, building on the work of the late Professor Roger Heim and me in eastern India, has identified with finality the *sūkara-maddava* as the *Pūtika*,³ a plant that figures conspicuously in the Brāhmaṇas and other early post-Vedic sacred Sanskrit texts. In this paper I will examine the Last Meal at Pāvā and the death of Gautama the Buddha at Kusi-nārā in what is today northern Bihar. I will focus attention on what he ate at his Last Meal—a matter of little theological importance to the Theravadin branch of Buddhism and none at all to the Buddhists of the Greater Vehicle, but pertinent to our mushroomic inquiries and notably, as I shall show, to the identity of Soma.

Of all the scholars who have dealt with the Last Meal of the Buddha, I believe only one, André Bareau, has addressed himself to the surprising anomaly offered by the possibility of either pork or mushrooms being served to the Buddha at this meal. Here is what Bareau has to say:

En effet, la viande de porc et plus encore les champignons sont des choses pour lesquelles les Indiens imprégnés de culture brahmanique, comme l'étaient le Buddha et une grande partie de ses disciples, éprouvent un profond, un insurmontable dégoût et que ne

consomment guère que certains tribus sauvages ou des gens de basse caste, rejetés par la bonne société et pressés par la faim. L'idée d'offrir au Bienheureux, pour l'honorer et le régaler, comme un mets de choix, . . . de la viande de porc ou des champignons est aussi insolite que si, dans une légende occidentale, on offrait à quelque éminent personnage un festin dont le plat principal serait une cuisse de chien ou une purée de goémon, des sauterelles frites ou des chenilles grillées: cela paraîtrait à juste titre une plaisanterie ou ferait croire à une erreur de copie. [*Recherches sur la biographie du Buddha*. Tome I, p 267. Paris. 1970. Publications de l'Ecole Française d'Extrême-Orient, Vol LXXVII]

Confirming what Bareau says, Chap V-5 of the laws of Manu, believed to have been committed to writing around the beginning of the Christian era, declares that:

garlic, leeks-and onions, mushrooms and (all plants) springing from impure (substances), are unfit to be eaten by twice-born men,

and this proscription is repeated in V-19:

A twice-born man who knowingly eats mushrooms, a village-pig, garlic, a village-cock, onions, or leeks, will become an outcast.

Here the prohibition carries a dire penalty. Mushrooms are forbidden in two further clauses, VI-14 and XI-156. The repeated prohibition applies expressly to twice-born men, which embraced the three upper castes.

The ban on mushrooms was no dead letter. Sir William Jones quotes from a commentator on the laws of Manu named Yama:

. . . the ancient Hindus held the fungus in such detestation that Yama . . . declares "those who eat mushrooms, whether springing from the ground or growing on a tree, fully equal in guilt to the slayers of Brāhmins, and the most despicable of all deadly sinners." [*The Works of Sir William Jones*, Vol V, pp 160–161, London, 1807.]

This is the most extravagant outburst of mycophobia that we have found anywhere, surely the most extravagant to be found in the Indo-European world, which is saying a good deal. The learned Brahman tells us that the simple mushroom-eater is as bad as the

³ Stella Kramrisch: "The Mahāvīra Vessel and the Plant Pūtika," *JAOS*, 95.2, April-June 1975.

murderers of Brahmins! Why such passionate, such exaggerated censure? Bareau, in comparing the Hindu eater of mushrooms to one among us who eats dog's flesh, was engaging in understatement.

Three months before the Last Meal at Pāvā and before his Mahāparinirvāṇa, the Buddha had been sojourning at Vaiśālī and thereabouts. While in the vicinity of Vaiśālī he had suffered a grave illness, attributed from ancient times to a chronic gastric upset, probably dysentery; had felt the weight of his years, had called himself an "octogenarian," and had announced his intention to go to Kusinārā and there three months later to experience the Mahāparinirvāṇa, the Final Extinction. He was predicting the time and place of his own end. He made his way to Kusinārā with his followers on foot, teaching the doctrine as was his wont, and it took him three months to cover the 140 kilometers. To his disciples and the villagers he made freely known his purpose: he never wavered in his resolution, nor did he hide it from anyone.

The day before the Buddha reached Kusinārā he arrived at the nearby village of Pāvā and passed the night in the mango grove belonging to one Cunda, a metal-worker or blacksmith, and therefore a śūdra, the lowest of the four castes in Hindu society. Cunda, appearing almost immediately, inquired what the Buddha desired. According to one of the Chinese recensions of the Buddha's life, the Buddha explained that he was to undergo the Mahāparinirvāṇa in Kusinārā: lamentations followed. Cunda invited the Buddha and his many followers to take their single meal the next day with him, and by his silence the Buddha accepted. Cunda withdrew to assemble the food and prepare it. In the morning Cunda came to summon the Buddha and his followers to the meal that he had prepared.

Cunda, as we said before, was a śūdra, a man of the lowest caste. On the other hand, as the metal-worker of the region he was a technician, comfortably off, extending hospitality on a moment's notice to the Buddha and his numerous followers, one accustomed to meeting and mixing with travelers including individuals of what are today called the "scheduled castes," —aboriginal tribesmen who were not Hindus and therefore not a part of the dominant Hindu society. His forge may well have been the *raison d'être* for Pāvā. When the Buddha arrived at Cunda's dwelling-place and was seated in the place prepared for him, he (according to the *Dīgha Nikāya*) addressed Cunda saying,

As to the *sūkara-maddava* you have made ready, serve me with them, Cunda, and as to the other food, sweet rice and cakes, serve the monks with them. [Chap. IV, ¶18, p. 138]

The Buddha then said to Cunda,

Whatever *sūkara-maddava* are left over to thee, those bury in a hole. [¶19]

In a hole, not just throw away, and we are told that the surplus *sūkara-maddava* Cunda buried in a hole. Apparently Cunda had brought *sūkara-maddava* for the whole company, as he had thought all would share in them, so there must have been an ample surplus.

Then the Buddha added these remarkable words,

I see no one, Cunda, on earth nor in Mara's heaven, nor in Brahma's heaven, no one among the Sāmaṇas and Brāhmaṇas, among gods, and men, by whom, when he has eaten it, that food can be properly assimilated, save by a *Tathāgata*. [¶19]

Obviously the Buddha had recognized at once what he was being offered, the *sūkara-maddava*, and he knew the mushrooms were of a species that would shortly smell bad ("stink") if they were not eaten or buried in a hole. (To this day the custom among some Santal seems to survive to bury any surplus *sūkara-maddava* in a hole.) Perhaps it was the first time in his life that the Buddha, of ksatriya origin, was being offered mushrooms to eat. But these particular mushrooms were familiar to him because of their unique role in the Hindu religion in which he had been brought up.

André Bareau appreciates to the full the solemnity of this dish of *sūkara-maddava*, though he did not know what it was. He says:

... cette nourriture, la dernière que consomme le Bienheureux avant son Parinirvāṇa, est une nourriture en quelque sorte sacrée, dont les riches qualités, la puissance essentielle, vont lui permettre d'accomplir cet exploit surhumain, la suprême Extinction. Cette richesse, cette puissance sont trop grandes pour être supportées par les autres êtres, hommes ou dieux, qui n'auront jamais, et de loin, à exécuter une action comparable. [*Recherches sur la biographie du Buddha*. Tome I, p. 271. Paris. 1970. Publications de l'Ecole Française d'Extrême-Orient, Vol LXXVII]

Here was the Buddha, at one of the two supreme moments of his life, unexpectedly offered at his last meal a dish that Hindus of the upper castes were forbidden to eat, an edible mushroom, a dish that was the surrogate for Soma when formally sacrificed in an utterly different manner and setting.³ Buddhaghōṣa quotes the Great Commentary (*Mahā-aṭṭhakathā*) as saying of Cunda's motives in offering this dish to the Buddha and his monks:

They say that Cunda, the smith, having heard that the Exalted One would attain *parinibbāna* that day, thought it would be good if he could live longer after eating this dish, and offered it wishing for the Master's longevity. [p. 27 *infra*]

Walpola Rāhula's comment on the Great Commentary from which we have extracted this quotation is as follows:

The *Mahā-aṭṭhakathā* (Great Commentary) is the most important of the ancient original Sinhala commentaries dating back at least to the 3rd century B.C., on which are based the present available Pāli commentaries of the 5th century A.C., including the Commentaries on the *Dīgha Nikāya* and the *Udāna* from which these two commentarial passages are taken. [p. 27 *infra*]

The Great Commentary cites hearsay ("They say . . .") as the reason that Cunda served those particular mushrooms on that day. The hearsay may be right, but if indeed Cunda felt the dish of *Pūtika* would extend the life of the Buddha, he must have confused the properties of *Soma* and of the *Pūtika*. The *Pūtika* enjoyed a unique status as the exalted surrogate for *Soma*, but, whereas *Soma* was consumed, the *Pūtika*, as Kramrisch quotes the sources,⁴ were mixed with the clay and then fired ritually in the making of the Mahāvīra pot and there is no reason to think that the Hindus of the three upper castes or even the Brahman hierarchs ate these fungi. Does not the text of the Great Commentary permit another interpretation: Cunda, a *śūdra* accustomed to eating the *Pūtika*, served them because it was the season of the rains (which had started when the Buddha and his suite were in Vaiśālī) and the mushrooms, which he had known all his life, were fresh from picking? If so, it was the Buddha who at once recognized them because of their role in the Hindu religion and stopped Cunda from serving them to the others. The Buddha was certainly not accustomed to eating mushrooms of any

kind, and here he was being invited to eat those slimy mucoid excrescences, as the twice-born Hindus with loathing would view them. May not this, combined with the emotional tension of his imminent extinction, have provoked a recrudescence of his intermittent attacks of dysentery?

I now interrupt our account of the Buddha's progress on his last day to set forth certain discoveries bearing on *sūkara-maddava*.

II. THE SANTAL AND THE *PUTKA*

By an accident of fortune the Santal people living now in western Bihar and Orissa have preserved for us, as though in a time capsule, the identity of the Sanskrit *Pūtika*, a plant until recently unidentified, an ingredient in the clay of the Mahāvīra vessel that was fired in the course of the Pravargya sacrifice. The *Pūtika* is known as having been the surrogate for Soma,⁴ though probably today by no Santal, and it figures conspicuously in the Brahmanas and other early sacred Sanskrit texts. As I said before, it was identified by Kramrisch on the strength of evidence produced by Heim and me.⁵ (Roger Heim, outstanding French mycologist, had served as President of the Académie des Sciences and was Director of the Muséum National d'Histoire Naturelle: he accompanied me on many of my field trips.)

The late Georg Morgenstierne, the Norwegian linguist, specialist in the Kafir and Dardic languages, also a Sanskrit and Persian scholar, first called my attention to an oddity of the Santal language of special interest to me, as it affected their mushroom vocabulary. Santali was not a specialty of his but he was a vast reservoir of general linguistic knowledge.

The Santal, who number some millions, live in villages scattered in the area of eastern Bihar known as the Santal Parganas, in the western north-and-south strip of West Bengal, and in Orissa as far south as the Simlipal Hills. The Santal are slight in build, neat in dress, with sleek, black hair and dark almost

⁴ See Manfred Mayrhofer: *A Concise Sanskrit Etymological Dictionary*, entry under *pūtikaḥ*, also Vol. 3, p. 761.

⁵ *Cahiers du Pacifique* #14, September, 1970: "Les putka des Santals, champignons doués d'une âme." p. 77. For those interested, the mushroom was *Scleroderma hydrometrica* (Pers.) H. var. *maculata* (Pat.) H. In Europe it breaks out into an *Astraeus*, but in India remains closed, a *Scleroderma*.

black regular features, their houses of red earth ornamented with curious painted geometric patterns and neatly disposed within and without, in these respects contrasting with the Hindus. By tradition they are food gatherers, hunters, fishermen, but are now taking to agriculture.

From the Indo-European point of view, the Munda languages, of which Santali is the biggest member, are peculiar: in Santali there are no genders,—no masculine, feminine, neuter. Their nouns are either animate or inanimate—endowed with a soul or without a soul. The entire animal kingdom is animate, has a soul. The whole of the mineral kingdom is inanimate, without a soul. There are oddities: e.g., the sun, moon, stars are animate. Strangely, the vegetable kingdom—herbs, shrubs, trees, the fungal world—is inanimate, but *with a single exception*, one species of mushroom, the *putka*. The Santal do not know why the *putka* is animate, or so they say. The *putka* is an underground fungus that is gathered for eating just as it appears, a snow-white little ball, in mycology identified by Heim as a *Scleroderma*, well known in Europe. In season it is commonly highly prized as food by the Santal, and much sought for by women and children.

For the last century the Norwegian Lutherans have made a vigorous play to be helpful in India by missionary activity among the Santal. The Rev. P. O. Bodding, a resident of the Santal Parganas from 1890 to 1934, mastered their language and compiled an admirable Santal-English dictionary in five large volumes, pointing out among other things the oddity of *putka*, which enjoyed in the vegetable kingdom the unique attribute of a soul. He could not explain this anomaly, nor did he venture an etymology for *putka*. But in the preface to his dictionary Mr. Bodding observed a noteworthy fact:

Strangely enough, the Santals use some pure Sanskrit words, which, so far as I know, are not heard in the present day Hindi.

I visited Dumka in the Santal Parganas for the first time in January 1965. The Rev. A. E. Strønstad, Mr. Bodding's successor, and Mrs. Strønstad put me up and Mrs. Strønstad graciously served as my interpreter. We asked elderly and knowledgeable Santal in Dumka and the surrounding villages why *putka* was animate. No one could tell us. Our best informant turned out to be Ludgi Marndi, the widow of a native Lutheran pastor. She told us that there was one entheogenic mushroom.⁶ Was it the *putka*? No, not at all. It was merely *ot'*, "mushroom" of the soulless

class. No one was able to find an example of this inebriating mushroom, but the description (big, growing only in dung mostly of cattle, and white reaching an intense cream color in the umbolate center) tallied with *Stropharia cubensis*. Neither were there any *putka* at the time of my visit: they would come after the monsoon broke. Ludgi Marndi and some other informants suggested that the *putka* was animate because it was found regularly in the sacred grove of *sarjom* trees near every village. (Santali *sarjom* = Hindi *sāl* = *Shorea robusta*.) But the sacred *sarjom* trees were not animate so why should a mushroom growing from their roots be? Furthermore, the *putka* grew also in mycorrhizal relationship with other species of trees. Ludgi Marndi seemed an especially good informant and just before we were leaving for New Delhi, defeated as we thought, I asked if I might talk with her again. We went over the same ground. Suddenly she leaned forward across the table to Mrs. Strønstad and in a whisper (as translated to me) said that she would tell her why she thought the *putka* were animate: "You must eat them within hours of gathering *for they will soon stink like a cadaver*." She spoke under considerable emotion. We knew not what this meant but at once I jotted down her translated words in my notebook and her remark appeared later, somewhat toned down, in the paper⁷ that Heim and I published.

My 1965 visit was followed by another with Heim in July-August 1967, he flying from Paris to Calcutta and I from New York. We started our quest in the Simlipal Hills and the village of Bisoī in Orissa, where the Santal and their close linguistic kin the Ho intermix, as well as several other peoples. Again we questioned the natives about why the *putka* were animate. In Nawana in the Simlipal Hills I spent the evening with Ganesh Ram Ho, the chief of the village, and he, as Ludgi Marndi had done, volunteered the information that there was an entheogenic mushroom, and his

⁶ "Entheogen" is a word devised by some of us for those plant substances that inspired Early Man with awe and reverence for their effect on him. By "Early Man" we mean mankind in prehistory or proto-history, before he could read and write, whether long long ago or since then or even living today in remote regions of the earth. "Entheogen" (or its adjective "entheogenic") has the advantage that it does not carry the odor of "hallucinogen," "psychedelic," "drug," etc., of the youth of the 1960s. See *Journal of Psychedelic Drugs*, Vol. 11 (1-2), Jan-June 1979, pp. 145-6.

⁷ Fn. 5, p. 65.

description tallied with Ludgi's; his testimony confirmed that it was probably *Stropharia cubensis* or a close cousin. (That these two excellent informants volunteered to speak of an inebriating mushroom, doubtless *Stropharia cubensis*, is a lead not to be neglected: it may have played a part in the cultural past of the Santal and of Soma.) But, just as before, it was "ud" and soulless. "Ud" is "mushroom" in Ho.

We published the account of our trips to the Santal country in *Les Cahiers du Pacifique*, #14, September 1970. Kramrisch in time saw our paper and she grasped immediately that the *putka* of the Santal was the *Pūtika* of the Brāhmaṇas, of the Pravargya sacrifice and the Mahāvīra pot.³ The *Pūtika* had been the surrogate for Soma and naturally it would possess a soul! Kramrisch deserves a rich accolade for discovering that Santali *putka* was a loanword from the Sanskrit *Pūtika*. When Soma was being abandoned, probably over a long period that ended shortly after B.C. 1000, the *Pūtika* took its place, not as an entheogenic drink like Soma in the earlier sacrifice but as a component with the clay in the ceremonial firing of the Mahāvīra vessel. Its stench (of which Ludgi Marndi had spoken) was turned into fragrance when the pot, held by tongs, was fired in the course of the rite. No one had ever known what plant it was. We now know that, like Soma, it was a mushroom, but a common mushroom, and it possessed divine qualities though less than Soma's.

In Santal culture not only is the *putka* animate, endowed with a soul: it possesses another of Soma's attributes. The belief is apparently universal among the Santal that the *putka* is generated by (mythological) thunderbolts.⁸ Long after the Brahmins have lost any use for or knowledge of this mushroom, and have lost all special contact with the Santal, these humble, hardworking people, untouchables, still believe that the *putka* is procreated by the lightningbolt, as the Vedic Brahmins believed that Soma was procreated by the Vajra of Indra, or Parjanya, the god of lightning. Here is another manifestation, another proof, of the breathtaking cultural intensity millennia ago of the religion of the hierarchs of the Aryans. The lightningbolt was thought of as the sperm, the spunk, fecundating the soft mother earth with the entheogenic mushrooms.

The Santal believe there are two kinds of *putka*, the *hor putka* and the *seta putka*, one smooth and the

other rough. Heim said the two kinds were merely different stages in the life cycle of the one species. The *hor putka* is the "man *putka*," not in the sense of male but of a human being, or of the "Santal" whom they naturally regard as *par excellence* the human being. The *seta putka*, which is rough, is the "dog *putka*," the dog not being despised as it is in Hindu culture. A few of the Santal spoke to us of a third *putka*, the *rote putka* or "toad *putka*." Most Santal did not recognize this term and of those who did, most could not say what kind of mushroom it meant. But when we were in Kathikund, a village in the Santal Parganas, we witnessed from our veranda a violent midday thunderstorm and within hours and then throughout the night a host of puffballs appeared on the plain before our bungalow. One of our Santal companions told us with assurance that these were indeed *rote putka*. In this instance the puffball was *Lycoperdon pusillum* but probably any other puffball coming in response to a thunder shower would be a *rote putka*. In short, the *rote putka*, which is not eaten by the Santal, is a false *putka*. . . . The entheogenic mushrooms of which Ludgi Marndi and Ganesh Ram Ho had told us, probably *Stropharia cubensis*, are not *putka*: they are merely *ot'*, or *ud* in the Ho language, enjoy no grammatical distinction in the languages, and so far as I learned no distinction in folklore. But it is imperative that this be explored much further. Does its entheogenic virtue account for the colored geometrical designs, endlessly varied, that decorate the exteriors of many Santal houses?

Throughout our visits to the Santal country the people we spoke with said that pigs dug for the *putka*, thus confirming what the canonical Pāli Commentary on the *Udāna* say of *sūkara-maddava* (p. 27, *infra*). But I was seeking a quotation and after returning to New York the Rev. Johannes Gausdal, a retired missionary living in Oslo, put me in touch with Mr. Gora Tudu, principal of Kaerabani High School, and we asked Mr. Tudu through Mr. Gausdal whether swine sought out the *putka* in the forest. Here is what he replied:

Whether the pigs eat *putka* or not? In this case also I got some *putka* from the forests. I tried them on a few pigs—the old *putka* were not liked, but the new ones seemed to be delicacies of the pigs. They ate them with relish. Also in the forest I found at several bushes where *putka* usually come up several marks of upturned earth, indicating that the pigs had been digging for the *putka*. [Letter in my *Munda* file]

⁸ Fn. 5, p. 64, bottom of page; *SOMA: Divine Mushroom of Immortality*, pp. 39–40.

I was careful not to divulge the reason this question was being asked. There are a number of genera of underground fungi divided among scores of species, and I should be surprised if they all drew pigs but perhaps they do.

Mr. Gausdal asked also about the smell of aging *putka*. Mr. Tudu replied, with unconscious humor:

I collected some *putka*, both *hor putka* and *seta putka*, and put them in dishes in dry condition as well as wet, just to see what the smell would be like after decomposition. In both the smell emitted was that of decomposing wood material, not at all bad in the sense of any blooded being. The smell was never too strong or filthy. The worst I could compare, the smell was that of rotting jute in muddy water.

Kramrisch tells me that rotting jute in muddy water creates a fearful stench. Mr. Tudu possesses the endearing quality of dirt farmers everywhere: their fondness for the smell of dung heaps, for example, is powerfully colored by what dung means for the crops. The earthy smells of farm yards also possess a likeable integrity.

The Gausdal-Gora Tudu correspondence was conducted in Santali, but my questions and his answers to them were in English.

We know that the Santal have not always lived where they do now. Six hundred years ago they lived to the west of Benares on the Chotā Nāgpur plateau, and tradition has it that long before then the Santal had lived much further to the West, just where no one knows, but possibly near the ancient center of Brahmanical sacrifices, where they could have had close relations with the Aryans, perhaps serving them before and through the shift from Soma to the *Pūtika*. This would also explain the other Sanskrit words in Santali that Mr. Bodding notes. Indeed he remarks in his preface to his Santal Dictionary that “the description of the Dasyus in the Vedas and the Mahābhārata seems to be adaptable to many a Santal.”

III. THE DEATH OF THE BUDDHA

Having completed the Santal interpolation, we will now revert to the text of the *Dīgha Nikāya* as translated by the Rhys Davidses.

After the discussion of the *sūkara-maddava*, the Rhys Davids translation continues with an astonishing development:

¶20. Now when the Exalted One had eaten the rice prepared by Cunda, the worker in metals, there fell upon him a dire sickness, the disease of dysentery, and sharp pain came upon him, even unto death. But the Exalted One, mindful and self-possessed, bore it without complaint. [Chap. IV]

This was a disconcerting turn of events, since the Omniscient One has but lately said that he sees no one, save a Tathāgata, who can properly assimilate the *sūkara-maddava*, which he has just eaten. If the circumstances were invented, as Bareau thinks, what a strange set of circumstances for utterly devoted followers of the Buddha to have invented! The mushrooms, now that we know precisely, were sound and there was never a risk; moreover, aged *Pūtika* would declare their age by their stench! And Cunda was a responsible man to buy and cook them. However, let us remember that in the upper Hindu castes where the Buddha had been brought up and lived out all his early life, even though he was now free from food tabus and caste distinctions, all mushrooms would be shunned as inedible; but here, at a critical moment of his life, he was being offered *Pūtika*. Did Cunda know the role of the *Pūtika* in the religion of the twice-born castes? Did he perhaps know it by rumor, inaccurately? Or did he not know it at all and was he serving these mushrooms solely for the excellent reason that they were fresh and in season? It is clear from the testimony of the *Dīgha Nikāya* that the attack suffered by the Buddha was sudden; it was violent; it alarmed the whole company; it was virtually over quickly, for not long afterward the Buddha instructed the faithful Ānanda that they should walk on to Kusinārā close by. But what could be more natural than a violent reaction in one brought up as a kṣatriya to consider mushrooms inedible? And with his large intestine being chronically inflamed with dysentery, his diarrhoea was a natural sequence. “Dysentery” is a translation of the Pāli *lohita-pakkhandika*, which means “bloody flux” in old-fashioned English.

The account in the *Dīgha Nikāya* is as though written to order for this explanation. Two quatrains, apparently independent of each other, are inserted in the text of the *Dīgha Nikāya* (¶20, p. 139) at this point. Buddhaghosa adds a note: “It should be understood that these are the verses by the Theras [Elders] who held the Council”—the Council that took place at Rājagṛha, at which some months later the initial plans were laid for mobilizing detailed recollections of the Buddha’s teachings and for organizing the Buddhist religion. The first quatrain shows how those

present murmured against Cunda, and, according to the second, there was also murmuring about the mushrooms. Here are the quatrains in the Rhys Davids translation:

When he had eaten Cunda's food,
The copper-smith's—thus have I heard—
He bore with fortitude the pain,
The sharp pain even unto death.

When he had eaten, from the mushrooms [=sūkara-maddava] in the food
There fell upon the Teacher sickness dire,
Then after nature was relieved the Exalted One
announced and said:
I now am going on to Kusinārā.

After the episode the Exalted One went out of his way to exonerate Cunda of blame, thus making even more tenable my explanation of his illness. For if Cunda had been guilty of negligence in choosing the mushrooms, why should the Omniscient One have exonerated him?

42. And the Exalted One addressed the venerable Ānanda, and said:—'Now it may happen, Ānanda, that some one should stir up remorse in Cunda the smith, by saying:—"This is evil to thee, Cunda, and loss to thee in that when the Tathāgata had eaten his last meal from thy provision, then he died." Any such remorse, Ānanda, in Cunda the smith should be checked by saying:—"This is good to thee, Cunda, and gain to thee, in that when the Tathāgata had eaten his last meal from thy provision, then he died." From the very mouth of the Exalted One, Cunda, have I heard, from his own mouth have I received this saying:—"These two offerings of food are of equal fruit, and of equal profit and of much greater fruit and much greater profit than any other—and which are the two? The offering of food which, when a Tathāgata has eaten, he attains to supreme and perfect insight; and the offering of food which, when a Tathāgata has eaten, he passes away by that utter passing away in which nothing whatever remains behind—these two offerings of food are of equal fruit and of equal profit, and of much greater fruit and much greater profit than any others. There has been laid up by Cunda the smith a karma redounding to length of life, redounding to good birth, redounding to good fortune, redounding to good fame, redounding to the inheritance of heaven, and of sovereign power.'" In this way, Ānanda, should be checked any remorse in Cunda the smith.' (p. 147–8)

Bareau concedes that Cunda and Pāvā may be original elements but, if so, thinks that they are the sole original elements in the narrative of the Buddha's stay in Pāvā:

Deux siècles après le Parinirvāṇa, ces deux noms, ici Pāvā et Cunda, étaient les deux seuls éléments anciens, peut-être même historiques, de l'épisode du dernier repas du Buddha. Aucun souvenir n'avait donc été conservé ni des incidents qui avaient pu s'y produire ni de la nature précise des aliments qui avaient été servis alors au Bienheureux. [Tome I, p. 258 in his *Recherches sur la biographie du Buddha*, Ecole Française d'Extrême Orient]

Perhaps in the light of our discoveries Bareau may grant more to the history of the Buddha's Last Meal in Pāvā as told in the *Dīgha Nikāya*. Too many had witnessed the episode with the mushrooms to permit the Theras to suppress it: his sudden illness had provoked too much talk.

Here is the account of the Buddha's death according to the *Dīgha Nikāya*, Chap. V,

1. Now the Exalted One addressed the venerable Ānanda, and said:—"Come, Ānanda, let us go on to the Sāla Grove of the Mallas, the Upavattana of Kusinārā, on the further side of the river Hiranyavatī."

'Even so, lord!' said the venerable Ānanda, in assent, to the Exalted One.

And the Exalted One proceeded with a great company of brethren to the Sāla Grove of the Mallas, the Upavattana of Kusinārā, on the further side of the river Hiranyavatī: and when he had come there he addressed the venerable Ānanda, and said:-

'Spread over for me, I pray you, Ānanda, the couch with its head to the north, between the twin Sāla trees. I am weary, Ānanda, and would lie down.'

'Even so, lord!' said the venerable Ānanda, in assent, to the Exalted One. And he spread a covering over the couch with its head to the north, between the twin Sāla trees. And the Exalted One laid himself down on his right side, with one leg resting on the other; and he was mindful and self-possessed.

In a note on this passage the Sinhala commentator added an explanation:

Tradition says that there was a row of Sāla trees at the head of that couch, and another at its foot, one young Sāla tree being close to its head, and another close to its foot. The twin Sāla trees were so called

because the two trees were equally grown in respect of the roots, trunks, branches, and leaves. There was a couch there in the park for the special use of the (periodically elected) chieftain of the Mallas, and it was this couch which the Exalted One asked Ānanda to make ready. (Fnt. p. 149)

In the last watch of the night the Buddha died, precisely as he had been predicting for three months, since he was in Vaiśālī.

There have been individuals in various parts of the world, and especially among the holy men of India, who have acquired by "concentration" (*samādhi*) control over some of the muscles that ordinarily function in response to stimuli beyond the human will. A. L. Basham has remarked on this in *The Wonder That Was India*, p. 327:

The ancient mystical physiology of India needs further study, not only by professional Indologists, but by open-minded biologists and psychologists, who may reveal the true secret of the yogī. For whatever we may think about his spiritual claims there is no doubt that the advanced yogī can hold his breath for very long periods without suffering injury, can control the rhythm of his own heartbeats, can withstand extremes of heat and cold, can remain healthy on a starvation diet, and, despite his austere and frugal life and his remarkable physical contortions, which would ruin the system of any ordinary man, can often survive to a very advanced age with full use of his faculties.

Basham fails to mention that occasionally death is the goal of this "concentration," but there is no reason to question that death can be the purpose of such an act of will. In recent years, when death has been the end result of this manifestation of will power, *mahāsamādhi* has sometimes been the term used when speaking of it.

The Buddha predicted the day of his death three months before and thenceforward announced freely the time and place of his own extinction. After his Last Meal the narrative says that on his initiative he walked the short distance to Kusinārā. Since the time of his death, no Hindu, no Buddhist, has ever suggested that he died of mushroom poisoning. His death has not provoked discussion among Buddhists. Knowing as we now do what the mushrooms were that Cunda served, they could have provoked a stomach upset in a Hindu mycophobe but they could not have caused his death. He died of his own will power, of his own *mahāsamādhi*. Or, rather than provoking his own death, did he not use yogic power, under trying

circumstances, to postpone his translation to *nirvāṇa* until he had reached his place of choice?

The surrogate for Soma explains and justifies the extraordinary words used by the Buddha in limiting to himself alone this dish. By consigning to a hole the surplus *Pūtika*, he showed himself familiar with its everyday properties. Now that we know the precise properties of this mushroom, its etymology as cognate with "putrid" is clarified,³ and its strong link with Soma is a good explanation for the Santal belief that it is generated by the divine lightningbolt.

Up to this point we have concentrated on only one source—the canonical Pāli Text of the *Dīgha Nikāya*—for our details about the life of Buddha. It is the Holy Scripture of the Theravadin branch of Buddhism with its headquarters in Śrī Lanka. There are, in addition, five other master recensions of his life, four in Chinese and one in Sanskrit. All five mention the stop in Pāvā and name Cunda as the host there, but none of them mentions *sūkara-maddava*. An obvious explanation for this omission is that the Chinese are natural mycophiles: they eat with relish all kinds of edible mushrooms and they know their mushrooms. They would not understand why the Buddha honored the *Pūtika*, saying he alone could digest it. For the Chinese all this would have been incomprehensible.

The Buddha and his followers were mostly Hindus of the upper castes who had withdrawn from obedience to the Hindu religion. When the Theras assembled at Rājagṛha, they were inevitably, even if they were rebels, heirs to the infinite complexity of habits, practices, subtle ways of thinking and feeling of the Brahmanic religion. When Buddhism became a world religion, it liberated itself from the Brahmanic religion and this included the mighty tradition of Soma and the Vedic hymns, and of course from the less powerful hold of the *Pūtika*. In the early days of Christianity, before it became a world religion, the pull of Jewish ways such as circumcision and the ban on pig-meat exerted influence on Jewish converts to Christianity, and the early Church faced a parallel conflict.

IV. THE BUDDHA'S LAST MEAL

The episode at Pāvā lends itself to various explanations; the written record contains a number of anomalies. If we were to offer the solution that we think is most likely, here it is.

There is only the Commentary on the *Udāna*, which Buddhaghōṣa presented as hearsay, to show that

Cunda the śūdra knew of the use made by the Brahmins of the *Pūtika*. Cunda certainly knew this mushroom as a universal favorite among mushroom eaters when it was in season and it was in season right then: he was taken aback when the Buddha recognized the mushroom and asked him, in astonishing language unfamiliar to his ears, to serve them to the Buddha only. Cunda had done himself proud in assembling mushrooms for the whole company, and now he was forbidden to give them to the guests or even to himself.

Shortly after the Buddha had eaten his mushrooms with rice he fell violently ill. This must have caused Cunda consternation and chagrin. Alarm was felt, and there was murmuring against Cunda and the mushrooms in the assembly, for all or almost all were twice-born men and had been indoctrinated against mushrooms. We can imagine Cunda's embarrassment but we have no information: an opaque cloud of silence falls over him.

In the *Dīgha Nikāya* the Buddha exonerates Cunda, somewhat stiltedly under the circumstances. Perhaps everyone remembered that the Buddha had spoken up for Cunda and many had heard him but none could recall what precisely he had said. Someone seems to have drafted the paragraph much later. The fitting exoneration of Cunda demonstrated the thoughtfulness and the nobility of the Buddha under most trying circumstances.

Was not "*sūkara-maddava*" introduced in place of *Pūtika* at Rājagṛha to avoid confusing people as to the Buddha's attitude toward the Old Religion? He showed an attitude toward the *Pūtika*, and he reacted to them, in a way that we today, under the circumstances, can understand for the first time.

And as for the diverse explanations in the two canonical Commentaries for *sūkara-maddava*, they may have been introduced at Rājagṛha also, or perhaps more likely late in Aśoka's reign when the need for an explanation became increasingly felt by the Buddhist community. No theological importance was ever given, then or later, to the Pāvā episode because, after all, the Buddha was under acute stress at the time, what with his illness, his imminent extinction freely predicted since he was in Vaiśālī three months before the episode at Pāvā, and the unexpected dish of *Pūtika* that suddenly confronted him. There had been far too much talk among those present to suppress the episode, but obviously the *Pūtika* was not to be identified plainly. The *sūkara-maddava* was a way to tell the truth but still to interpose obstacles to its understanding. The word may have been a neologism invented *ad hoc*.

Now we see for the first time in how dramatic a predicament the Brahman proscription on mushrooms for the twice-born castes accidentally involved the Buddhist religion at the very moment of its birth. We still do not know—we will probably never know—when that proscription came into force, perhaps over centuries while the Vedic hymns were being composed, or possibly when the hierarchs among the Brahmins learned of the entheogenic virtues of *Stropharia cubensis* as known to the lower orders living in India, or when Soma was finally abandoned and the *Pūtika* adopted as its surrogate. But we do know how effectively the Buddhist Theras fudged the facts in the *Dīgha Nikāya*, until an inquirer 2,500 years after the event appeared, assembled the evidence, and with the help of Georg Morgenstierne, Roger Heim, Stella Kramrisch, Wendy Doniger O'Flaherty, and above all of the Santal people, fitted together the jigsaw pieces.

V. THE INDUS VALLEY AND KASHMIR

When we published *SOMA Divine Mushroom of Immortality* in 1968 I pointed out in it that in the 1028 hymns of the RgVeda there was never a mention of the blossoms, fruit, seed, leaves, branches, bark, or roots of the plant—a telling clue where to look for the divine herb. But there was another botanical fact that deserved full recognition, but I had not yet focussed on it.

Botanists divide plants between phanerogams and cryptogams. The phanerogams include all flower- and seed-bearing plants, whether trees, shrubs, creepers or climbers, herbs and grasses, whether cultivated or uncultivated. The cryptogams are lower orders of vegetation, less developed along the evolutionary trail, and the mushrooms are the cryptogams that interest us. Only in recent centuries have three or four species out of thousands lent themselves to commercial exploitation, and a meager handful also to expensive cultivation in laboratories. In Aryan times, in the Indus Valley and Kashmir, there was the widest variety of climate, owing to the variety of accidented terrain therein—lofty mountains, low lying plains, valleys, wetlands, arid stretches—and any needed phanerogam could probably have been grown in some part of that large country. *But only those mushrooms grew there that the country produced spontaneously.* Since we know that the supply of Soma was limited at best to the mountains and must have been further reduced when the monsoon failed, conforming to what we know about Soma in Vedic times, this points to the entheogenic mushroom *Amanita muscaria* for their Soma. That the birch and also the conifers act as

hosts to *A. muscaria* was not realized by anyone among the Aryans, and therefore no one thought of planting the host trees to see whether by this means man could thus increase the yield of the holy plant.

Other fungal entheogens grow at the lower levels. They come in cattle dung, are easily identified and gathered, and are effective. But they fail to conform to Brahman practices: they are known to tribals and śūdras. Soma on the other hand exacts self-discipline of the priests, a long initiation and training: it is, for proper exploitation, an affair of a priestly *élite*. But the possible role of *Stropharia cubensis* growing in the dung of cattle in the lives of the lower orders remains to this day wholly unexplored. Is *S. cubensis* responsible for the elevation of the cow to a sacred status? And for the inclusion of the urine and dung of cows in the *pañcagavya*? And was that a contributing reason for abandoning Soma? Given the ecological conditions prevailing in the Indus Valley and Kashmir, only a few of the Aryans could know by personal experience the secrets of the Divine Herb. The cult of Soma must have been shaped by the peculiar circumstances prevailing in the area, but ultimately those circumstances must have doomed that cult. Today it lives on in India only as an intense and glowing memory of an ancient rite.

Under the British Raj the rich and diverse vegetation of India was admirably studied, and George Watt's encyclopaedia *Dictionary of the Economic Products of India*, 1889–1896, in eleven volumes, edited and partly written by him, is a major legacy of the British rule in India. However, the mycophobic British did little to advance knowledge of mycology, and the Hindus nothing. No one ever suggested a mushroom for Soma, let alone *A. muscaria*. Our *SOMA* came out in 1968 but no *A. muscaria* since then has yet been found in Pakistan or Kashmir: there have been numerous reports of finds but voucher specimens have not been deposited in herbaria. Dr. Roy Watling, mycologist of the Royal Botanic Garden of Edinburgh, spent three weeks in the field in 1978 on a general survey of the Kashmir area, in the vicinity of Srinagar. He collected in stands of birch in two areas but he arrived there late in the growing season and moreover the season was dry. In his printed report⁹ he writes, "The species *A. muscaria* is almost certainly native to the *Betula*-zone of northern India." There he found *Betula utilis* from 9,000 feet up to the timber

line at 10,500 feet but no *A. muscaria*. In the North-western Himalayas the birch grows intermixed with *Rhododendron* in scrub-vegetation up to 11,500 feet.

We may think we are feeling the frustrations of the Aryans but by comparison with them we are making only lackadaisical efforts to find a few voucher specimens, whereas the Brahmans must have developed urgent need for quantities of fruiting bodies to dry, and then to reflate, and bring to the pressing stones. Their needs must have been constantly increasing with the increasing population. Whatever may have been the case later, the relations at first with the natives were surely hostile. The natives seem to have come to occupy the intermediate mountain heights, precisely where *A. muscaria* grows and where the RgVeda time and again says Soma grows. As we know from the *Śatapatha Brāhmaṇa*, the Brahmans depended for their Soma supplies, in large part at least, on the natives living in the mountains. The supply depended on the weather and the state of the relations with the natives, whereas the needs were swelling with every generation. The Brahmans must have found it in their interest to cultivate the *Dasyus* and the *Dasyus* would have found it advantageous to discover every spot where *A. muscaria* grew, above all the stands of birch but also other host trees. (*A. muscaria* has been reported lately from Tamilnadu, especially from the Nilgiri Hills, in Southern India, but its presence there has been attributed by mycologists to plantings of exotic conifers in the past century.) Most of the Soma sacrifices must have used make-do phanerogamic substitutes and in the post-Vedic *Brāhmaṇas* and other writings we learn how the priests from early times faced this scarcity with such make-do plants.

The Brahmans probably continued to trade with the mountains of Afghanistan seeking Soma, and with the Hindu Kush, but there is no knowing whether these tribesmen were friendly, perhaps intermittently. The *Afghanistan Journal* 6.2, 1979, announced the finding of *A. muscaria* in Nuristan, in the Shetul Valley high in the Hindu Kush in the extreme north-east of the country. The authors, Gholam Mochtar and Hartmut Geerken of Kabul, talked with three old codgers, ostensibly *habitués* of the "ravens' bread," claimed to be *A. muscaria* from which an inebriating concoction is made. The episode is insufficiently documented to permit conclusions about its bearing on *Amanita muscaria* and the Soma question. Their report antedates the Russian invasion.

The use of substitutes by the Aryans must have been a reluctantly adopted practice from the start. They are mentioned for the first time in the last batch of hymns incorporated into the canon, Mandala X 85

⁹ Watling, Roy and Norma M. Gregory: "Larger Fungi from Kashmir," *Nova Hedwigia*, Band XXXII, Brunswick, 1980, J. Cramer.

through to the end, 191. In *SOMA* we failed to take into consideration these hymns of Mandala X, since they were admitted to the canon at a late stage, shortly before the Vedic age ended. But some years ago Professor Clifford Wright, in a lecture delivered at Cambridge University, took the position that many of those hymns, the last to be admitted to the canon, on strong stylistic grounds were by no means the last to be composed. There is a verse in these hymns that speaks of the substitutes. That hymn may well have been composed centuries earlier:

RgVeda X 85.3: One thinks one drinks Soma because a plant is crushed. The Soma that the Brahmans know—that no one drinks.

This conforms to our present thinking: the scarcity of Soma was not to be explained by the spread of the Aryans southward, then eastward down the Yamunā and beyond the confluence with the Ganges. The scarcity had always existed, and the make-do substitutes had been a chronic problem.

MEMORANDUM

BY WALPOLA RĀHULA OF THE EARLY SOURCES
FOR THE MEANING OF *SŪKARAMADDAVA*

SŪKARAMADDAVA

The original Canonical Pali passage from the *Mahā-parinibbānasutta* of the *Dīghanikāya*, Pali Text Society edition (London 1966), Vol. II, p. 127:

*Atha kho Cundo kammāraputto tassā rattiya acca-
yena sake nivesane pañitaṃ khādaniyaṃ bhojaniyaṃ
paṭiyādāpetvā pahūtaṃ ca sūkaramaddavaṃ Bhaga-
vato kālaṃ ārocāpesi: 'Kālo bhante, niṭṭhitaṃ bhat-
tan'ti.*

Translation:

Then at the end of that night, Cunda, the smith, having made ready in his house hard and soft delicious food, and also a big quantity of *sūkaramaddava*, announced the time to the Exalted One, saying: 'The time, Lord, has come, the meal is ready.'

In explaining *sūkaramaddava* in this passage the Pali Commentary of the *Dīghanikāya*, *Sumaṅgalavilāsini*, Pali Text Society ed. (London, 1971), Vol. II, p. 568, gives three different opinions:

*Sūkaramaddavan ti n'ātitaruṇassa n'ātijjṇassa ekajeṭ-
ṭhakasūkarassa pavattamaṃsaṃ. Taṃ kira muduṃ
c'eva siniddhaṃ ca hoti. Taṃ paṭiyādāpetvā sādhu-
kaṃ pacāpetvā'ti attho. (Colombo ed. of the *Sumaṅ-
galavilāsini*, Part I, (1918) p. 395 adds within
brackets): [Eke bhaṇanti: sūkaramaddavaṃ pana
muduodanassa pañcagorasa—yūsapācanavidhānassa
nāma etan'ti yathā gavapānaṃ nāma pākānāmaṃ.
Keci bhaṇanti: sūkaramaddavaṃ nāma rasāyanavidhi,
taṃ pana rasāyanasatthe āgacchati, taṃ Cundena
Bhagavato parinibbānaṃ na bhavyeyyā'ti rasāyaṃ
paṭiyattan'ti.]*

Translation:

Sūkaramaddava means meat available (in the market) of an excellent (first-rate) pig neither too young nor too old. This is soft and fatty. 'Having made it ready': having cooked it well is the sense. (Some say: *sūkara-maddava* is the name for a culinary preparation of soft rice made into a broth with the five products of the cow,¹ just as *gavapāna* is the name of a culinary preparation. Others say: *sūkaramaddava* is a chemical preparation [elixir]. It is found in the science of chemistry. That chemical preparation [elixir] was made by Cunda thinking that the *parinibbāna* of the Exalted One might not take place.)

The story of Cunda offering *sūkaramaddava* to the Buddha occurs exactly in the same way in another canonical Pali text, *Udāna*. The *Paramatthajotikā*, Commentary on the *Udāna* (Colombo, 1920), p. 279, in explaining *sūkaramaddava* gives four different opinions:

*Sūkaramaddavan'ti sūkarassa mudusiniddhaṃ pavat-
tamamsan'ti Mahāatṭhakathāyaṃ vuttaṃ. Keci pana
sūkaramaddavan'ti na sūkaramamsaṃ, sūkarehi
madditavamsakaḷāro'ti vadanti. Aññe: sūkarehi mad-
ditappadese jātaṃ ahicchattan'ti. Apare pana sūkara-
maddavaṃ nāma ekaṃ rasāyanan'ti bhaṇimsu. Tañ
hi Cundo kammāraputto ajja Bhagavā parinibbāyis-
sati'ti sutvā 'appeva nāma naṃ paribhuñjitvā cira-
taraṃ tiṭṭheyyā'ti Satthu ciraṇvītukamyatāya adāsī'ti
vadanti.*

Translation:

It is said in the Great Commentary (*Mahāatṭhaka-
thā*)² that *sūkaramaddava* is soft and fatty pork (flesh of pig) available (in the market). But some say: *sūkara-maddava* does not mean pork (flesh of pig), but

bamboo shoot (bamboo sprout) trodden by pigs; others say that it is mushroom grown on a spot trodden by pigs; still others have maintained that *sūkaramaddava* is a certain elixir. They say that Cunda, the smith, having heard that the Exalted One would attain *parinibbāna* that day (lit., today) thought that it would be good if He could live longer after eating this (preparation), and offered it wishing the Master's longevity.

¹ Five products of the cow: 1) milk, 2) curd, 3) buttermilk, 4) fresh butter, 5) clarified butter (ghee). W. R. [Walpola Rāhula is a Buddhist monk of our day and he renders in English the Sanskrit word *pañcagavya* as befits our times. In the past, for millennia *pañcagavya* represented: 1) milk, 2) coagulated or sour milk, 3) butter, 4) urine, and 5) dung. R.G.W.]

² The *Mahāaṭṭhakathā* (Great Commentary) is the most important of the ancient original Sinhala commentaries dating back at least to the 3rd century B.C., on which are based the present available Pāli commentaries of the 5th century A.C., including the Commentaries on the *Dīghanikāya* and the *Udāna* from which these two commentarial passages are taken. W.R.

EPILOGUE

When I began working with Gordon Wasson on *SOMA*, almost twenty years ago, we had, at first, no suspicion that Soma might have been a mushroom: we just wished to collect the texts relating to Soma and look at them with a botanical as well as an Indological eye. It was only when I

casually mentioned to RGW the urine-drinking, Soma-drinking episode in the *Mahābhārata* that he thought of *Amanita muscaria* as a possible identity for Soma, but from that moment on he became increasingly convinced that this was the case. I was certain that the evidence proved Soma was an entheogen (we called it an hallucinogen then), and that it was not a form of alcohol (as had been theretofore widely believed) but was a drug provoking an ecstasy of a very special kind. Here is a truth of great importance in the study of later Indian religion and this was the major contribution that RGW had made to Vedic studies.

I was, however, not yet convinced that Soma was a mushroom. I felt that the arguments rested primarily on the interpretation of adjectives, many of them words for colors, and mythological traits, many of which applied to other gods as well, permitting other interpretations as well as the interpretation that identified Soma with the fly-agaric. As an Indologist, rather than a botanist, I still feel that the broader hypothesis—that Soma was an entheogen—is more significant than the narrower one—that it was a mushroom. Over the years, however, the new evidence that RGW has brought to light, particularly the evidence linking the Buddha's last meal to Soma through the double links of the Vedic *Pūtika* and the Santal *putka*, does in fact make it seem likely that Soma was a mushroom, as RGW believed from the first moment, and, when we recall the religious role of urine mentioned above, specifically the fly-agaric. But each of the three levels of the hypothesis—that Soma was an entheogen, a mushroom, and the fly-agaric—adds a valuable dimension to our understanding of both Vedic and post-Vedic religion.

WENDY DONIGER O'FLAHERTY

Chicago

January 15, 1982

Flesh of the Gods

THE RITUAL USE OF HALLUCINOGENS

EDITED BY

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WILLIAM A. EMBODEN, JR.

Ritual Use of *Cannabis Sativa* L.: A Historical-Ethnographic Survey

Despite much writing to the contrary, there is but a single species of *Cannabis*—popularly called marihuana—and that is *Cannabis sativa* L., the cultivated hemp, so named by Linnaeus in 1753. Much of the confusion regarding the botanical identity of this historically and culturally fascinating plant stems from the botanical name changes it has undergone through time: to cite but a few examples, the pre-Linnaean botanists Bentham and Hooker treated *Cannabis* as a member of the nettle family, Urticaceae; later it was assigned to the mulberry family, Moraceae, and given its own tribe, Cannaboideae. More recently, anatomical and morphological studies assigned *Cannabis* to its own family, Cannabinaceae, within the order Urticales.

Although the common name "hemp" has come to be inextricably associated with this genus and species, there are actually more than twenty plant families that produce products known as hemp; the term can apply to any of a number of fibers of plant origin, so that *Cannabis* and hemp are not in fact synonymous.

There is only one species of *Cannabis*, but there is evidence to suggest that the plant has undergone natural selection and selection by man for perhaps 6000 years, and this fact, coupled with migration, has led to recognition of three varieties within the single species: *mexicana*, *americana* (*gigantea*), and *indica*. The North American and Mexican varieties may achieve heights of up to twenty feet; the Indian variety (*indica*) is relatively small, but it produces a more potent resin and in greater abundance than the other varieties, which have developed in America since the introduction of *Cannabis* some time after the discovery and conquest of the New World.



Fig. 33. A flowering plant of *Cannabis sativa*.

There is a certain degree of variation in the growth habits of *Cannabis*; most commonly it is found growing as an annual, which must be re-planted each year, but occasionally it assumes the habit of a perennial, developing in the process a heavy, woody stem. Sexes are usually found on separate plants (the dioecious condition), but occasionally a single plant is found to have both male and female parts, borne separately (the monoecious condition).* The leaves are digitate, with varying numbers of lobes and serrate margins.

All the plant parts bear trichomes, or hairs, of varying sorts. Some are simple and unbranched, others branched, and still others terminate in a gland which secretes resin. Another type of hair, called a scale, consists of a series of cells flattened in a plane parallel to the leaf surface; this type of trichome is also secretory. The frequency of capitate resin-producing glands supported by uniseriate or biseriate stalks is greatest on the female carpels. The frequency of glandular hairs is also greater on the female flowering parts than on the rest of the plant. The fruit coat covers the seed coat in such a manner as to conceal it and is densely

* Sex is determined by a $2n = 18 + xx$ or xy system, but variation in sex can be accounted for by heterozygous genes on x chromosomes and an occasional yy individual.

covered with glandular trichomes. Hairs with calcium carbonate deposits at the base are referred to as cystoliths. These are characteristic of *Cannabis* as well as of several genera in other families (cf. *Urtica*). The flowers of *Cannabis* are so minute on the female as to be quite inconspicuous, except as axillary clusters. On the male they are pendulous and conspicuous by reason of the yellow anthers, which produce pollen. After flowering (anthesis), the male plants die; however, the females persist until completion of fruiting.

The green pigment chlorophyll is essential to the growth of *Cannabis*. Therefore, we must regard as nonsense reports of seeds flushed into a sewer giving rise to plants that grew in darkness and were silver or white rather than green, and more potent than other plants. Accordingly, the oft-repeated tale of "Manhattan Silver" as an especially powerful variety of *Cannabis sativa* (Bloomquist, 1968) has no foundation in fact and is botanically unsound.

The herb that Linnaeus christened *Cannabis sativa* over two centuries ago originated somewhere in the desert region to the south and east of the Caspian Sea. As a cultivated plant it does not seem to be as old as some of the better-known Old-World food plants, but it certainly boasts respectable antiquity among cultigens. That it manifests itself today in a number of forms and that it has become adapted to a wide variety of climates and physical environments, ranging from the equator north to 60° latitude, is due largely or wholly to the intervention of man over a very long time: human exploitation of *Cannabis* is thought to reach back as far as 6000 years, with actual cultivation of *Cannabis* for a variety of purposes beginning only slightly more recently. If we are to believe Boyce (1900), a cloth made of the fibers of *Cannabis sativa* stem was found among 6000-year-old cultural remains in a cave in Europe. One may assume that the edible seeds of the plant were not ignored by the ancient cave dwellers. Of more exotic uses we cannot be certain. However, the earliest civilizations of Mesopotamia brewed intoxicating beer of barley more than 5000 years ago; is it too much to assume that even earlier cultures experienced euphoria, accidentally or deliberately, through inhalation of the resinous smoke of *Cannabis* while clothed in the coarse fibers of its stem?

THE CULTURAL USES OF *Cannabis*

China

It is quite certain that the ancient Chinese did not ignore the properties of this herb, for we have the pharmacopœia of the legendary Em-

peror Shen-Nung, allegedly compiled in 2737 B.C.* The ancient herbal recognizes both male and female plants, but there is a decided bias in favor of the female, or pistillate plant, evidently because it is the only sex that produces a significant amount of intoxicating resins. Shen-Nung, or "Divine Cultivator," is said to have founded Chinese medicine with the appearance of this herbal; during his experimentations with different plants he is said to have taken as many as twelve "poisons" a day. He must have tried exudate of *Cannabis* and given his approval, for he recommended it for "female weakness, gout, rheumatism, malaria, beriberi, constipation, and absent-mindedness."

By the fifteenth century B.C. the Chinese book known as the *Rh-Ya* was compiled, and in it there is mention of the herb *Ma*, the *Cannabis sativa* plant. Not only were the fibers and potent resins employed at this time, but the *Rh-Ya* describes the first ritualistic or shamanistic use of the plant.

The most detailed early account of the uses of *Cannabis sativa* in early China is to be found in the *Shu-King*, written in 500 B.C. (Bretschneider, 1870). When the plant grows under favorable conditions, the main stem becomes highly lignified, or woody. It was the practice of the early Chinese to carve this wood into the likeness of a serpent coiled around a rod (not unlike the caduceus or Staff of Aesculapius, which had its origin in the Greco-Roman world and is still with us as the traditional symbol of the physician). This image was used in curing rituals; a relative of the patient beat on the sickbed with the snake rod in order to dispel evil spirits.

Despite these descriptions, it is rather difficult to estimate the prestige of the plant in ancient China, for while we have early conservative warnings in which it is cursed as a "liberator of sin," we have equally ancient texts that call it the "giver of delights." In any event, its medical uses persisted in China for many centuries. In A.D. 220 the celebrated Chinese physician and surgeon Hua-T'o performed surgery using *Cannabis* resins mixed with wine, known as *Ma-Yo*, as an anesthetic, rather like the use of *Mandragora officinarum* roots and leaves mixed with *Atropa* leaves by the early Greeks. Both these preparations proved efficacious in relieving pain (*Cannabis* lulls the sensation of pain, while the mandrake and nightshade render the patient unconscious). Hua-T'o records testimonials by his patients praising their pain-free operations. Bloomquist (1968) states that the Chinese had no use for "technicolor

* Regarding the herbal of Shen-Nung, known as the *Pen Ts'ao Ching*, F. N. L. Poynter and H. L. Lei (1969) are of the opinion that it was really compiled in the late Han Dynasty, about the first century A.D. This is based on evidence that there was no written language in China in the third millennium B.C.

fantasies from hemp exudate"; I would suggest, rather, that the conservative element in China may have realized the potential threat to authority in a liberated younger generation given over to using the exudate of hemp, and for this reason inveighed against it. Conservative resistance was similarly manifested against the introduction of alcohol, tobacco, and even coffee.

Ancient Mediterranean

Nepenthe, that "potent destroyer of grief" of which the poet Homer wrote in the ninth century B.C. and which was first discussed in an Egyp-



Fig. 34. The legendary Chinese Emperor Shen Nung, the "Divine Cultivator," who is credited with the introduction of agricultural implements and the discovery of the medicinal properties of plants in the third millennium B.C. His pharmacopoeia, which mentions both the male and female plants of *Cannabis sativa*, with their respective medical uses, is said to have been first compiled in 2737 B.C. Note the typically shamanic horns in the eighteenth-century French portrait, copied from an earlier Chinese painting.

tian papyrus dated *ca.* 1600 B.C., has been taken by some—most recently Andrews and Vinkenoog (1969)—to refer to *Cannabis sativa*. I believe this to be in error. If we combine the testimony of Homer with that of Diodorus Siculus, who wrote of the women of Thebes dispelling their anxiety with nepenthe, we cannot escape the conclusion that the herb or preparation in question was not *Cannabis* but the exudate of the unripe capsules of the opium poppy, *Papaver somniferum*, or poppy milk mixed with *Mandragora* (mandrake), *Hyosyamus* (henbane), *Atropa* (deadly nightshade), and other herbs of similar soporific powers. Thus, it was not *Cannabis* that Helen used to assuage her anguish but the milk of the opium poppy. So popular was the latter that early Greek cameos show the goddess of night, Nix, distributing poppy capsules; terra-cotta figurines from Knossos with slit poppy capsules as coronas can also be seen in museums. One city in early Greece was even known as Opion, the City of the Opium Poppy.

Actually, the confusion should never have arisen in the first place. The use of nepenthe and *Cannabis* was clearly differentiated. There is a classic Greek term, *cannabeizein*, which means to smoke *Cannabis*. *Cannabeizein* frequently took the form of inhaling vapors from an incense burner in which these resins were mixed with other resins, such as myrrh, balsam, frankincense, and perfumes; this is the manner of the shamanistic Ashera priestesses of the pre-Reformation temples in Jerusalem, who anointed their skins with the mixture, as well as burned it. *Cannabis* is also the plant which Democritus (*ca.* 460 B.C.) knew as *potamaugis*, and which he said was drunk with wine and myrrh to produce delirium and visionary states. Democritus observed the “immoderate laughter” that occurred erratically following a draught of this decoction.* The first Greek botanist, Theophrastus (371–287 B.C.), wrote of *Cannabis* under the name *dendromalache* and gave one of the first accurate accounts of the plant.

Lucilius was the first Roman writer to give an account of *Cannabis*, *ca.* 100 B.C. It was said to be so like hemp-agrimony in appearance that some herbalists called it the cultivated hemp-agrimony.† There is no doubt that the fiber obtained from the stem of *Cannabis* was prized over that of *Agrimonium*, for the former was the cordage of most of the early vessels; Hiero II, King of Syracuse, bought hemp fiber for the ropes of his vessels in Gaul (France). So esteemed was the fiber that it figured

* Democritus himself was called by his compatriots “the laughing philosopher.”

† Actually, the resemblance is superficial, in that both have palmate leaves with conspicuous serration along the margins. Both also produce a high-quality fiber from the stem. However, hemp-agrimony (*Agrimonium cannabium*) belongs to the sunflower family, Compositae, and no competent botanist could mistake the two plants. One is at a loss to account for the choice of *Agrimonium* to adorn the cover of a book, by Andrews and Vinkenoog (1969), which purports to be an authoritative history of *Cannabis*.

prominently in mythology: it was said to be the stuff that Penelope wove and tore apart to discourage her suitors during the absence of her husband, Ulysses, and the cord that Circe wove magically during the night. Could it also have been the mythical thread that *Atropos* measured out and severed in order to determine the life of a man? All these legends involve manufactured fiber as well as a mystical state of mind, and they are associated with cultures that were well aware of the plant, which embodied both economic and mystical properties.

Elaborating on the writings of the botanist Dioscorides, who preceded him by a century, the famous physician Galen (A.D. 130–200) spoke of *Cannabis* as a medicinal, but he also recorded a nonmedicinal, non-ritualistic use of *Cannabis* mixed with wine as a sweetmeat terminating heavy banquets. This confection promoted warmth and excited pleasure.

To ethnobotanists, one of the mysteries of the Ancient World is why the Egyptians should have preferred the cultivation of *Linum*, from which they obtained flax, or linen, to the cultivation of *Cannabis*. Certainly soil conditions and climate were favorable in the Nile Valley. Moreover, the fiber of *Cannabis* is in no way inferior to that of *Linum*; quite the contrary. Nevertheless, an analysis of the wrappings of numerous mummies has revealed that only flax fiber was used. Also, recent studies of embalming practices in ancient Egypt show that linseed oil, myrrh, balsam, and other oils and resins were used to coat the bodies, but not *Cannabis* resin. Both *Linum* and *Cannabis* provide an edible seed from which meal and oil can be obtained. Although both wine and beer were consumed in great quantities and also poured as libations to the gods, there is nowhere mention of hemp resins as part of such religious usage. Finally, it should be noted that no elements of any *Cannabis* cult are to be found in the Babylonian tablets relating the epic of Gilgamesh.

Arabia: Hasan and Scheherazade

Of the man from whom hashish got its name, al-Hasan ibn-al-Sabbah (A.D. 1124), only the sketchiest biographical data have survived.* He was probably a Persian by birth, some say from Tus. At an early age in the town of al-Rayy, he was tutored in the Batinite tradition. (The doctrine of *batin*, meaning inner, or esoteric, was founded in the ninth century A.D. by the Ismailites; its adherents believed the Koran should be interpreted allegorically and religious truth ascertained by the discovery of inner meaning, of which outer form was "but a veil intended to keep that truth from the eyes of the uninitiated.") A year and a half in

* For an authoritative analysis of Moslem sects, including that of al-Hasan, see Philip K. Hitti, *History of the Arabs* (London: Macmillan, 1968), from which some of the historical data in this section were drawn.

Egypt were sufficient to prepare him for his expected position as a missionary of the Fatimid caliphate, last of the medieval Moslem states, which had its center in Cairo. Back in his native land, it soon became obvious to those around al-Hasan that he was driven by strong personal ambition. He claimed to be a direct descendant of the Himyarite kings of South Arabia, and this assertion, together with his undoubted personal charisma, drew many young men to him. These dissenters from orthodox Moslem thought became known as hashishin, those of the "new word" (the full name of al-Hasan was Hashishin ibn-al Sabbah.) This term has become Anglicized as "Assassins."

In 1090 al-Hasan and his followers gained possession of the mountain fortress Alamut, situated in an extension of the Alburz mountain chain at 10,200 feet above sea level, near the towns of Baghdad and Basra. The name Alamut has been translated as "nest of the eagle," an apt description since it overlooked the shortest caravan route between the Caspian shore and the Persian highlands and thus gave al-Hasan and his men a most strategic position from which to launch surprise raids on those passing below.

The movement of the Assassins was essentially religiously motivated. Al-Hasan was not driven to assassinate those around him by bloodthirsty personal ambition, as has sometimes been claimed; rather, he and his followers felt that in order to promulgate their new religion, they first had to eliminate by whatever means necessary those who taught contradictory philosophies. As the sect developed, it drew away from the Ismailite tradition and became increasingly agnostic. The number of his followers grew to more than 12,000. All were part of a hierarchy, of which Hasan was "Grand Master," his closest companions "Grand Priors," those below them "Spreaders of the Faith," and those of the lowest order "Fiad'is," the executioners of all who were considered to be a threat to the faith. Alamut was maintained by the spoils derived from plundering the caravans from the East headed for Baghdad, and soon the fortress grew into elegant palaces, gardens, and pavilions of great wealth. Perhaps this was one of the attractions for the young men who joined the cult as "Fiad'is."

Marco Polo, who passed through the region in 1271, a half-century after al-Hasan's death, left this account of the "Grand Master's" court:

He kept at his court a number of the youths of the country, from twelve to twenty years of age, such as had a taste for soldiering. . . . He would introduce them into his garden . . . having first made them drink a certain potion which cast them into a deep sleep. . . . When therefore they awoke and found themselves in a place so charming, they deemed it was Paradise . . . and the ladies and damsels dallied with them to their heart's

content. When the Old Man would have any prince slain, he would say to such a youth: "Go thou and slay So and So; and when thou returnest my Angels shall bear thee into Paradise."

There is no historical basis for the allegation that the slayers of al-Hasan did their work in states of malice or frenzy, intoxicated with hashish, or for the tales of depravity and debauchery at the court. These were promulgated by enemies of the Assassin cult and popularized by Marco Polo, among others. Most of the information we have about the Hashishin actually comes from the descendants of the Mongolian Hulagu, who in 1256 seized the fortress and palaces in Persia. At this time all the books and records of the cult were destroyed. In truth, the slaughter performed by the Assassins was less bloody and wanton than that which was then and later carried on in the name of another religious movement—Christianity. We do know that a member of the Assassins, Nizam-al-Mulk, was a founder of hospitals, observatories, and universities and was himself a statesman and scholar—hardly a picture that accords with the vicious character attributed to the sect and its adherents.

Attitudes of the time toward *Cannabis* are well reflected in that great favorite of Eastern and Western literary tradition, the Arabian epic *A Thousand and One Nights*. In a story told by Scheherazade on the 798th night, a Sultan in disguise has the misfortune of being deliberately urinated upon in the house of a *cadi*, or lowly magistrate, by another guest, a fisherman. The fisherman believed himself to be Sultan, for he had swallowed enough hashish "to destroy a hundred-year-old elephant." In the morning *cadi* and fisherman were called to the palace, where the Sultan revealed himself as the hapless guest of the night before. The *cadi* fell to his knees to beg for mercy, while the fisherman, to the Sultan's delight, replied, "What of it? You are in your palace this morning, we were in our palace last night." To the Sultan this truth was the "sweetest noise in all our kingdom," and he said to the fisherman, "We are both Sultans of this city." The implication, of course, is that the consumption of hashish was at least accepted, if not encouraged. This is supported also by the fact that at the beginning of the tale Scheherazade says, "Allah had willed that the *cadi* should also be given to the use of hashish." If hashish consumption had been beneath contempt, as al-Hasan's detractors claimed, tales of this period would hardly implicate Allah himself in the practice.

Asia Minor

The historically documented use of *Cannabis* in the funeral customs of the ancient Scythians, a nomadic people who ranged eastward as far as what is now central Siberia, appears to have originated with their defeat and brief domination by the Thracian Getae in the early sixth

century B.C. The Getae were a well-organized society of horsemen and hunters, with a body of laws and a belief in the soul and a hereafter comparable to the Christian heaven or Germanic Valhalla. Their shamans, known as Kapnobatai, used hemp smoke to induce visions and oracular trances.

According to the German botanist Ludwig Wittmaack (1839–1929), we may assume from the discovery of *Cannabis* seed found in a Scythian funeral urn that the Scythians used hemp for nourishment and pleasure at least as early as the fifth century B.C. De Candolle (1869) goes so far as to suggest that the Scythians were disseminating *Cannabis* to other areas around 500 B.C. Non-Oriental Scythian shamanistic practices with *Cannabis* doubtless stemmed from the Getae. After anointing their heads, the mourners placed posts in the ground and wrapped them with cloth. They then rolled heated rocks from funeral fires and placed them in censers; it was on these rocks that the hemp was thrown, and the resulting vapors were inhaled. Herodotus, born in 484 B.C., tells that the Scythians howled with joy after such vapor baths, and that they danced and sang. An account by Aeschylus (525–456 B.C.) reports that the hemp was simply thrown on the fire and the smoke inhaled. Still another contemporary account tells of the smoldering herbs being covered with large skin blankets, which were periodically lifted so that all might inhale the accumulated vapors.

Herodotus makes no mention of shamanistic ritual in the ceremony, but he was given to such oversights. We can be reasonably certain that among the Scythians, as among other Turko-Tartar peoples, shamanic ecstasy played an important role in curing as well as funeral rites. It was one of the shaman's duties to act as psychopomp for the soul of the deceased, escorting it on its difficult journey to the netherworld. This the shaman was able to do by transporting himself into a state of mystical ecstasy, in which his soul left his body to serve as spiritual guide.* Then as now, psychotropic plant preparations played an important role. It is interesting that in a number of related Indo-European languages,

* The Soviet archaeologist S. I. Rudenko discovered additional archaeological evidence for the use of *Cannabis sativa* to induce trances in Scythian funeral rites during his excavations of the great burial mounds (*kurgans*) at Pazaryk, in the Altai, between 1947 and 1951. Rudenko found metal support rods and bronze censuring vessels containing not only stones which had been heated to produce hemp-seed vapors but even the seeds themselves, some of them burnt. According to Rudenko, all these objects were used for purification ceremonies after the funeral, similar to those described by Herodotus in his report on the Scythians living on the shores of the Black Sea (Badasz, 1968: 65–66). The Swiss classical scholar K. Meuli (1935) suggests that the "howling" reported by Herodotus was nothing else but the characteristic shouting by shamans in their trances and that the entire purification rite must have been a form of shamanism, related to the shaman's role as psychopomp, the guide of the soul to the beyond. Interestingly enough, Meuli sees a relationship between the Scythian ecstatic vapor bath and the well-known curative vapor bath of Arctic peoples and American Indians.—Ed.

bangha, the Iranian word for hemp, simultaneously refers to mushroom intoxication, hemp intoxication, and the hemp plant itself. Today in India, certain concoctions of *Cannabis* are known as *bhang*, and there are those who still insist that *bhang* is the Soma of the Vedic hymns, a contention with which R. Gordon Wasson especially has taken sharp issue.

Shamans or shaman-priests also used the ecstatic state for spiritual instruction. Zarathustra, the founder of Persian religious thought in the sixth century B.C., considered himself a shaman, or, as he himself termed it, a psychopomp. According to the Gathas, united in ecstasy with Zarathustra, the dead as well as the living disciples could commune between heaven and earth. Both melotherapy and versotherapy (music and chant) were necessary to the process, which had to occur in a *maga*, or enclosed space. This is curiously reminiscent of curing and divining rituals by shaman-like curers in Mexico and Peru, who intoxicate both themselves and their patients or supplicants with psychotropic plant decoctions in order to enter a mystical realm where causes and cures of illness or misfortune may be learned.

Sara Bentowa, of the Institute of Anthropological Sciences in Warsaw, has studied the original text of the Old Testament and its Aramaic translation, the Targum Onculos, and finds that the word for cane (*kane* or *kene*) appears both alone and linked to the adjective *bosm*, the Hebrew word for aromatic (in Aramaic *busma*) (Bentowa, 1936). According to the Polish scholar, both *kane bosm* of the Old Testament and the Aramaic *kene busma* refer to *Cannabis sativa*. In the Mishna, the collection of traditional Hebrew law, the *kanbos* bears an unmistakable affinity to the Assyro-Babylonian *kannab*, the Sanskrit *cana* and *sana*, and the Scythian *cannabis*, to mention but a few of the more than 100 synonyms compiled by Dr. Bentowa for this plant. She further traces the migration of the word with the migrations of the Semites through Asia Minor. A number of traditions developed around the hemp harvest that involved rituals based on intoxication from the volatile resins and oils. One such tradition was the offering of hemp seed as a sacrifice to one's ancestors. There seems to be an obvious link between such ritualistic gestures and the funeral ceremonies of the Scythians.

India

The most likely route of migration for *Cannabis* is from the tribes of Iran into India, where it did not grow indigenously. The contemplative nature of Hinduism had already led these people to the tranquilizing root of *Rauwolfia serpentina* and the sedative root of *Withania somnifera*. It may be that the prior acceptance of these plants facilitated the easy assimilation of *Cannabis* in India; in any event, it was soon inseparable

from most of the religious philosophies. Consequently, the greatest vocabulary for *Cannabis* and its derivatives emerged from India. It became known as the "heavenly guide," and just as "Father Peyote" resides in the psychotropic cactus for some Indians of the southwestern United States, so a Guardian lived in the leaves of *Cannabis* for the early Indo-Iranians. Even a dream of the hemp plant was considered an omen of good fortune, and to long for it implied a future happiness. The resins had a pharmacological significance comparable to that outlined in the pharmacopœia of Shen-Nung. The Indian dispensaries claimed that it was efficacious in treating dysentery, sunstroke, phlegmatic tempers, indigestion, lack of appetite, lispings, and muddled intellect, among other disorders. It was believed that to experience *Cannabis* intoxication was to fix one's eyes on the Eternal. Hence, decoctions of *Cannabis* resin were used before reading holy writings or entering sacred places.

Andrews and Vinkennoog (1969) cite the hymns of the Rig-Veda in support of their contention that the sacred plant they celebrate (especially throughout the ninth book) as *soma* is *Cannabis*. However, although one of the earliest Sanskrit names for *Cannabis* is *sana*, meaning a hollow reed or cane, it cannot be equated with *soma*. *Soma* as a deity was the brother of Indra, and the Vedic hymns, which date prior to 1000 B.C., mention both *Soma* the god and *soma* as a plant. Although the two are inextricably intertwined and mention of the plant is made in at least three books of the Vedic hymns, none of the rather obscure descriptions fits *Cannabis*. R. Gordon Wasson, the undisputed authority on *soma*, has identified the sacred plant of the Rig-Vedas as the mushroom *Amanita muscaria*. Others have attempted to identify *soma* as *Sarcostemma acidum*, a leafless prostrate Asclepiad which is native to north India and Pakistan. Both *Amanita* and *Sarcostemma* have psychotropic properties, and either would be better suited to the descriptions of the Sanskrit *soma* than the distinctive leafy *Cannabis*.

It is true, however, that according to one tradition in India the resin of *Cannabis*, under the name *Vijaya*, was the favorite drink of the god Indra and that he gave it to the people so that they might attain elevated states of consciousness, delight in worldly joy, and freedom from fear. Hence it is customary for Hindus to throw idols into the river and rejoice with friends by embracing and drinking *bhang* * on the last day of the *Durga pooja*.

Africa

The route by which *Cannabis* entered Africa remains obscure, but presumably it came from India or Saudi Arabia. It seems to have been

* *Bhang* is a decoction of water, milk, *Cannabis* resin, cucumber and melon seeds, sugar, and black pepper.

in the Valley of the Zambezi in pre-Portuguese times—that is, before A.D. 1500. None of the more elaborate techniques of using *Cannabis* in the Mediterranean or the Near East accompanied the plant into Africa, and practices in the central part of the continent in the thirteenth century were very simple. The confections which were known to Galen, such as *Cannabis* wine, or the date, fig, raisin, nut, and *Cannabis* confection of the North Africans, apparently had not reached central Africa at this early date. The simple but efficacious practice of throwing hemp plants on the burning coals of a fire and staging what might today be called a “breathe-in” seems to have been popular initially. This was elaborated into a ritual in which members of a given tribal unit would prostrate themselves in a circle around the fire and each would extend a reed into the fumes in order to capture the volatilized resins, without the accompanying irritation produced by standing over the vapors and inhaling. At a later date the fire was elevated to an altar, where a man could sit or stand while inhaling through a tube extending into the smoke.

The dervishes used *Cannabis* resins mixed with oils of seeds to produce a “hypnotic” which, when drunk in that strength, induced a trancelike sleep in which revelation was considered inevitable. In milder doses it was used as a medicinal in cases of madness, hysteria, and convulsions or spasms.

As the weed moved southward in Africa, the techniques of its consumption became more elaborated. The tribes of the Upper Zambezi made a variety of pipes of gourds, bamboo stalks, and even coconut bowls for smoking the resins and crude leaf material. It was the North Africans who developed the water pipe, which cooled and to some degree purified the smoke. Resins alone were used under the name *Kif* in this apparatus.

When von Wissmann visited the Congo, in the late nineteenth century, he noted vestiges of *Cannabis* usage among the Balubas, a Bantu-speaking tribe of the Belgian Congo. This was significant in that many other tribes were subjugated by the Balubas, and their rituals were essentially the same. Hemp-smoking in this area seems to have originated in 1888, when Kalamba-Moukenge, then chief of the Balubas, ordered all the ancient idols and fetishes of conquered territories to be publicly burned. He realized that a multiplicity of tribal gods would hardly serve as a unifying force, so he acted to strengthen his overlordship and bind his subjects into one “nation” by replacing the old idols with a new and more powerful one—*Cannabis*! On state and feast days, the Baluba smoked hemp in gourd bowls one meter in circumference. In addition to ritualistic use of *Cannabis*, men of the tribe frequently smoked hemp as a pleasant evening pastime. Some subjects of Kalamba-Moukenge were

so impressed with the new *Cannabis* ritual that they united themselves under the name *bene-Riamba*, or sons of hemp.

The eminent composer and writer Paul Bowles, who has lived in North Africa for a number of years, identified more than twenty terms that apply to *Cannabis* or *kif* and its use in various guises among the North Africans (Bowles, 1962). So important is *Cannabis* in this area that, according to Bowles, the plant has been involved with some important areas of esthetics: "Music, literature and even certain aspects of architecture have evolved with *Cannabis*-directed appreciation in mind." Some homes actually have *kif* rooms, where family groups gather to sing, dance, and relate histories based on ancient cultural traditions.

North African men carry their *kif* in a *mottoni*, or pouch, of two to four compartments, each containing a different grade of *Cannabis*. Degrees of esteem or friendship are indicated by the quality of *kif* offered to another. Bowles points out that large numbers of Moslems have used *Cannabis* because alcohol is forbidden by Koranic law; any attempt to impose the Dionysian tradition upon these peoples, for whatever reasons, can lead only to a confusion of moral values. Although *kif* is outlawed in North Africa, the district of Ketama in the western Rif still produces crops of hemp on its steep hillsides and supplies most of Morocco. Lack of success in eradicating the habit is confirmed by recent visitors to the area, as well as by the trade in *chquofa*, clay pipes designed specifically for *kif* smoking.

Substitution of the physiologically addictive poison alcohol for the nonaddictive euphoriant *kif* seems to be inevitable in Africa. However, a new nationalistic trend, increasingly more apparent, may help to preserve the old traditions.

The Origin of a European Ritual

Although *Cannabis* must have been available in Western Europe since relatively early times, little interest was shown in the plant until ca. 1800, when Napoleon's battered army returned to France from the Egyptian campaign with hemp resins to sustain them. From Egypt itself the earliest records of hemp cultivation and the use of hemp resin date from the eighteenth century. The custom was not readily assimilated by the populace of cosmopolitan France, but in Paris a group of avant-garde writers and artists found considerable pleasure in this new euphoriant and founded a *Cannabis* ritual, well documented by Theophile Gautier, who wrote of the odd gathering in a *feuilleton* of *La Presse Medicale* (n.d.) and in the *Revue des Deux Mondes* of 1846. The ritual was certainly French in character, notwithstanding both Egyptian and Algerian antecedents.

A certain Dr. Jacques Joseph Moreau, of the Hôpital de Bicetre, was

responsible for introducing the use of *Cannabis* resins in the hospital for the mentally ill. Dr. Moreau had investigated some of the potions used in the Middle Ages for treating mental illness and had used extractions of *Datura stramonium*, or Jimson weed, with some success in treating his patients. In 1841 Dr. Moreau substituted hashish for *Datura* and, after three years of experimentation, published his studies along with an appendix of observations by Gautier. Almost a decade before the association with Dr. Moreau, Gautier had attained his literary laurels with the perverse and brilliant *Mademoiselle de Maupin*. In the preface to this chronicle of a transvestite, Gautier proclaimed that abandonment to the senses was the will of God, an attitude that later became the manifesto of the decadents. It is not surprising that a man to whom the "superfluous" was the most essential element of life should found an organization devoted to the veneration of the senses in the form provided by *Cannabis*.

Le Club des Haschischins, formed in 1844, found a home in the elegant Hotel Pinodan on the fashionable Île St. Louis. Gautier's description of the hotel, built by Lauzun, suggests an atmosphere that was certainly conducive to hallucinations. Meetings were held monthly, as regularly as any religious service and with equal attention to the appointments to the ceremony—flickering lights, ceilings painted with mythological scenes, Venetian goblets, fine porcelain, velvet tapestries from Utrecht, and Egyptian chimeras, all provided elements of the phantasmagoria that was part and parcel of *Le Club*. Doctor Moreau would dispense the intoxicating resins from a crystal vase, pronouncing with each spoonful the sententious dictum, "This will be deducted from your share in paradise."

Each participant would down the green paste and then drink coffee in the Arab manner, without sugar and heavy on the grounds. A banquet followed the *Cannabis* *hûrs d'oeuvres*. It was not until the end of the feast that the members would begin to feel the intoxication that would culminate in hallucinations. The environment reinforced this vision state, and music was introduced for the further delectation of the guests. According to Baudelaire, the uninitiated were bound to be disappointed in their expectations of marvelous visionary experiences, for "man cannot escape the fatality of his physical and moral temperament. Hashish will be for a man's familiar thoughts and impressions a mirror that exaggerates, but always a mirror." However, it is difficult to assess the writings of Baudelaire on the effects of hashish, since he was so given to a mixture of opium and alcohol that the influence of the different drugs is likely to have been inseparable.

Perhaps the most interesting aspect of the European use of *Cannabis* is its ritualistic nature. Baudelaire had had access to *Cannabis* in his

earlier travels in India, and Gautier had used this substance in his experiments with Dr. Moreau; however, they and the other members of *Le Club* preferred a group ceremony in which their visions might to some degree be shared with the other participants—shades of howling Scythians! *

A New World Ceremony in Mexico

Although *Cannabis* was unknown in the New World prior to the Conquest and most Indian groups continue to spurn it as alien to their indigenous culture, of late there have been reports of rituals in which marihuana has come to replace hard-to-get aboriginal hallucinogens. As early as 1902 the pioneer ethnographer Carl Lumholtz reported that “Tepecanos” (Tepehuano) in northwest Mexico sometimes substituted *Cannabis sativa*, which they called *rosa maria*, when peyote was not available from neighboring Huichol Indians.

A particularly interesting account of a Tepehua (no relation to “Tepecano”) Indian ceremony with *Cannabis* was published in 1963 by the Mexican ethnologist Roberto Williams García of the University of Veracruz, Mexico.† The Tepehua, who live in scattered communities in the mountains of Veracruz, Hidalgo, and Puebla, belong linguistically and culturally to the Totonac of Veracruz, northernmost branch of the Maya language family, but their culture, especially the non-Christian elements in their religious beliefs and rituals, are very close also to those of Nahua and Otomí-speaking Indians of Veracruz and adjacent states in southeastern Mexico.

In his account of Tepehua religion and ritual, Williams García (1963: 215–21) describes in some detail a communal curing ceremony focused on a plant called *santa rosa*, “The Herb Which Makes One Speak,” which he identified botanically as *Cannabis sativa*:

The ritual takes place in the community of San Pedro, under the direction of a diviner or shaman named Antonio. The reputation of the

* And, for that matter, of marihuana-using G.I.’s in Vietnam. CBS News in 1970 broadcast an extraordinary film of a marihuana “ritual” in which soldiers employed a shotgun—“anthropomorphized” as “Ralph”—to inhale large quantities of marihuana smoke. As depicted in the television news film, the combat unit’s leader ejected the shells from his shotgun, inserted a lighted marihuana pipe in the breech and then blew the smoke through the barrel directly into the mouth of each of his men in turn! There are some interesting implications in such a use for a weapon of death, especially since bamboo was readily available to achieve the same effect (but without the same symbolism). The use of a gun here is reminiscent of the manner in which the Waika Indians of Venezuela blow charges of a powerful hallucinogenic snuff into one another’s nostrils with a long tube. This tube, though shorter than the blowgun, is otherwise similar to this deadly hunting weapon. It is unlikely that the Army unit had access to this bit of anthropological information, so that their particular communal way of ingesting the euphoriant must be regarded as spontaneous ritualization.—Ed.

† I am indebted to Peter T. Furst for this reference.

herb is great, for it is said to have the power to induce a fleeting "madness" which can be calmed only by the shaman. In the hut of Antonio there is an altar with candles, plates, crystals, and small archaeological clay heads used in divination. On an upper platform are images of saints, and especially of the Virgin, who is considered to be a companion of the divine Sun. Boxes beneath the altar contain cutout bark-paper spirit figures (*muñecas*, or dolls),* which are taken out for this ceremony of purification. Ashes, representing the extinction of life, and earth from the cemetery are symbolically placed on the altar to represent the sacred place where such a ceremony should properly be performed. They also have the effect of removing impure air and freeing the people of evil spirits.

Two female attendants wash the hands and feet of the diviner, and he in turn ritually washes ears of corn. He enters the room, distributes flowers, and squats to pray; upon rising he cleanses the participants with branches of lemon. *Costumbre* (native ritual) music is played by temple musicians while Antonio stands at the altar and arranges branches that have been purified by the smoke of a censer. The participants are invited to seat themselves, holding burning candles. Antonio prays, blows on a whistle, and rings a bell. He touches them on the shoulder with the purified branches, upon which they are required to spit.† One of the women does the same for Antonio. He then lights the altar candles and concludes the homage to the ancestors and the purification of the participants.

The group then moves to an adjacent hut which contains an altar bearing the Sacred Heart of Jesus and a plate, covered by a cloth, with the herb *santa rosa*. This is taken back to the temple and distributed ceremoniously to the participants, to be eaten by them. The female participants dance in a circle and speak in a high voice. The atmosphere is by no means solemn; rather, there is light conversation, occasionally interrupted by laughter. Leaving the temple the group moves to a cross in an adjoining patio, where they genuflect and prostrate themselves, after which they re-enter the temple. Speech now becomes oratory and the entire atmosphere changes to one of fervent music, song, declamations, ringing of bells, rhythmic movement, dancing, whistling, and prayer.

* These cutout spirit figures are characteristically Otomí, attesting to the strong influence Otomian culture has had on the Tepehua. Otomí shamans use them widely for curing and sorcery as well as in connection with fertility rituals for crops and fields, as do the shamans of the Tepehua. Although the art of bark-papermaking survives in several parts of Mexico, the real center of this ancient craft is the Otomí village of San Pablito, in the Sierra de Puebla, where bark paper is traded widely. The art of bark-papermaking is an old one; stone bark beaters have been found in archaeological contexts dating to 900 B.C.—Ed.

† Spittle in general, but especially in a ritual context, is a symbol of transcendence.—Ed.

One old man, who had been given a considerable quantity of *santa rosa* for assisting Antonio, is said to be speaking to the sanctified herb. Antonio prays and then dances with a handkerchief, an act signifying that children of the village who are sick with the grippe are now cured. Soon the music ceases and soft drinks are passed around. Day breaks, the intoxication is wearing off, and the ceremony is near an end. Only a few ritual ingredients remain to be used up by the participants before they return to their everyday pursuits.

According to Williams García, *santa rosa* is considered both herb and intercessor with the Virgin. It is worshiped as an earth deity and is thought to be alive and comparable to a piece of the heart of God. It is also dangerous: were it not for prayers and rituals, it could affect people adversely. It could assume the form of a man's shadow (soul) and make him sick, put him in a rage, or even lead to his death.

A recent personal communication from a North American ethnobotanist, David Wheeler, who has spent several years in the state of Oaxaca among several groups of Indians, provides interesting corroboration of Williams García's observations among the Tepehua. As is known, mushroom cults focused on several varieties of hallucinogenic fungi flourish in Oaxaca. Less well known is the fact that several other hallucinogenic plants, including *Heimia salicifolia*, *Calea zacatechichi*, *Genista canariensis*, *Salvia divinorum*, *Rivea corymbosa*, and *Ipomea violacea*, are also used in Oaxaca, either when mushrooms are unavailable or as the preferred mystical substance in curing and other rituals. *Genista canariensis*, as the name implies, is an introduction from the Canary Islands, and one of the mushrooms used ritually is also an importation from the Caribbean. In cultures so attuned to the use of psychotomimetics it is perhaps not surprising that yet another alien plant, *Cannabis sativa*, should have found ready acceptance, at least in one area of the highlands.

The advantages of growing *Cannabis* in the volcanic soils of the highlands are considerable. Of the nine-odd cannabinols found in *Cannabis sativa*, the delta-1 form is by far the most active. However, the amount of ultraviolet light striking these plants may convert relatively inactive isomers into potent forms. The agricultural traditions among the Indians here are very ancient; long experimentation has led to the production of a variety of excellent crops perfectly adapted to the varied climates and soil conditions of the mountains and valleys. It is hardly surprising that such experienced farmers should have discovered in short order that the finest *Cannabis* is derived from plants that do not flourish in the usual sense but have been "tortured" by an extreme environment and by unusual pruning practices.

According to Wheeler, when the plants are just beyond the cotyledonary, or seedling, stage, they are pinched so as to remove the apical meristem which terminates the shoot tip. This part of the plant is responsible for the production of auxins, plant hormones, and the absence of this site of synthesis causes lateral meristems, or side shoots, to become active. Thus, instead of the usual tall cane, a small bush is produced. Once every week the plant is pinched in such a manner as to keep it within a few feet of the ground. The form it assumes in the course of such pruning is that of an urn. Shoots which would normally fill the interior are removed, so that as resins are formed they volatilize within the confines of the urnlike shrub. At maturity this strange crop resembles a topiary of sorts, the grotesque "urns" being so heavily coated with resins that the surface of the plant has a crystalline appearance. Pinching is so frequent as to interfere with the normal flowering of the females, and the auxin changes also lead to changes in pigmentation in some instances. Cyanins, which give a red appearance to plants, may accumulate, lending the plants an acharacteristic color as well as form. The leaf morphology is so changed that palmate leaves are no longer characteristic, being replaced by verticillate balls of entire leaves and abortive flowers. Indeed, the botanist would be hard pressed to identify the genus of these tortured plants.

That these practices figure in the syncretic Christo-pagan religious traditions of the local population is hardly surprising. The red color, the copious exudation of crystalline resin, akin in appearance both to sacred copal and to traditional shamanistic rock crystals, and the urn shape probably all contribute to ritualization of this psychotomimetic botanical import. Of great interest in this connection is the peculiar mode of harvesting *Cannabis*. As the bloodlike color begins to appear, the plants are "crucified" by inserting wooden splinters through the stem at right angles to one another just above the ground. The effects of this practice on the physiology of the plant are not known, but one might assume that this act of crucifixion has implications beyond the purely ritual, even if the Indians are concerned only with the latter. It is possible, for example, that wound hormones produced in response to the piercing with wooden splinters may enhance the quality of the resins even beyond what is accomplished by the pruning practices described above.

Be that as it may, the resultant material is especially effective, acting rather like hashish. However, it does *not* constitute the hashish of illegal drug traffic, since it is utilized exclusively in the area in which it grows and for ritual purposes akin to those involving the use of indigenous hallucinogens.

CHEMISTRY AND EFFECTS OF *Cannabis* RESINS

It is the resins of the *Cannabis* plant that are responsible for the euphoriating properties. In Nepal, one of the few areas of the world where marihuana use is now legal, the resins were once collected by having naked men run through the fields planted to marihuana and then scraping off the sticky substance that adhered to their skin; a more sanitary mode of harvesting was to have the men wear leather aprons which were scraped, eliminating body hair and perspiration that might impede marketability. At one time the resins were listed in the U.S. Pharmacopoeia as a tincture for treating fatigue, fits of coughing, rheumatism, asthma, delirium tremens, migraine headaches, and the cramps and depressions associated with menstruation. The Tax Act of 1937 imposed such rigid controls on the use of *Cannabis* that it was effectively eliminated from most drug dispensaries. Cannabinols, of which more than eighty have been isolated from *Cannabis sativa*, form the group to which the active principles belong. Although a number of these have been ascertained to be active euphoriants, the delta-1 form of tetrahydrocannabinol is believed to be of primary activity, and in laboratory synthesis the synthetic product obtained has most of the quality that occurs in resins.

The drug acts mostly on the central nervous system. In moderate doses the effects on laboratory animals and in man are the induction of euphoria, or a dreamy, nonaggressive, semisomnolent state. Unless one is working with synthetic THC (tetrahydrocannabinol), dosages are difficult to determine because of the qualitative differences in resins coming from different varieties of plants in nature.

Massive doses of the resins have been given to dogs without causing death, and there is no recorded fatality from overdosing with either the natural resins or THC in man, stories to the contrary notwithstanding. Fitzhugh Ludlow, who popularized *Cannabis* in alarmist language in a chronicle which appeared serially in *Harpers' Magazine*, owes much to his reading of De Quincey's *Diary of an English Opium Eater*, and one can hardly take his claims of "horrible addiction" seriously. The death of Baudelaire, attributed by some to hemp resins, may be more realistically laid to advanced tertiary syphilis, opiate addiction, and alcoholism.

Most *Cannabis* in the United States is smoked as a crude leaf material, known as marihuana. The "high" it produces lasts from two to four hours, whereas ingestion of the resins lasts twelve or more. The state produced has been described as having a duality in which the individual may be both high and objectively aware of his subjective state. Thus, it is possible for a person to be under the influence of marihuana and

yet perform routine duties with considerably greater competence than an individual who is lightly intoxicated by alcohol. Surprisingly, this has been shown to apply even to driving an automobile, in tests conducted by the University of Oregon and the Oregon Department of Motor Vehicles with both alcohol and marihuana. (Needless to say, because of individual variability and other reasons, one would hardly advocate mixing marihuana smoking with driving.)

Perhaps the only noticeable effect of marihuana use is altered time and space perception, which also accounts for obviously altered speech pattern while under *Cannabis* influence. Weil and Zinberg (1969) have reported on interference with retrieval of information from immediate memory storage in the brain, but at this writing this is the only scientifically acceptable study that points to a "danger" from using moderate amounts of this material. We must await the findings of more scientific studies and long-term research to ascertain whether or not there might be other major health hazards associated with the use of these resins. Recently it has been pointed out that inexperienced individuals (the drug-naïve group) show lessened motor coordination when under the influence of marihuana while experienced users may actually show improvement, as evidenced by standard performance tests (Weil, Zinberg, and Nelsen, 1968).^{*} Other physiological changes, such as hunger, increased urination, etc., are curious but negligible effects.

SOME CONCLUSIONS

Available evidence to date suggests that *Cannabis* may have been used as a gathered, if not cultivated, plant as early as the Late Neolithic and that, with the exception of Egypt, it was one of the most prominent cultigens in Bronze and Iron Age civilizations. The Scythians may have

^{*} Results of an interesting study on the disposition and metabolism of delta-9 tetrahydrocannabinol in man by four researchers of the National Institute of Mental Health were reported by Lemberger *et al.* in the journal *Science*, Vol. 170 (1970), pp. 1320-22. The researchers found that the major active component of marihuana, D-9-THC, administered intravenously to normal human volunteers persists in plasma for more than three days, that tetrahydrocannabinol is completely metabolized, and that the radioactive metabolites are excreted in urine and feces for more than eight days. The report suggests that THC, as a nonpolar compound, may accumulate in fat or other tissues, such as those of the lung, which have an affinity for drugs. "If, indeed, the D-9-THC is found in the lung, then in man this would be even more significant since inhalation is the usual route of administration," according to the researchers. THC accumulation in the tissues, they write, may explain in part the phenomenon of so-called "reverse tolerance" in chronic users of marihuana (who may need progressively smaller doses to achieve the desired euphoriant effect, in contrast to the need for ever-larger doses in addictive narcotics such as heroin); possibly, the report states, "a critical degree of tissue saturation must be attained before effective threshold levels of D-9-THC can be achieved." It may also explain in part why novice users of marihuana often report no effect whatever from their first experimentations with *Cannabis*.—Ed.

cultivated the plant for some time before employing it ritually, for De Candolle in 1869 adduced evidence that they transported *Cannabis* from Central Asia and Russia during their westward migrations just before the Trojan War, or *ca.* 1200–1300 B.C. He mentioned that it might have been disseminated by earlier incursions of the “Aryans” into Thrace and Western Europe but was unable to produce evidence to support this.

Shamanistic traditions of great antiquity in Asia and the Near East had as one of their most important elements the attempt to find God without a vale of tears; that *Cannabis* played a role in this, at least in some areas, is borne out in the philology surrounding the ritualistic use of the plant. Whereas Western religious traditions generally stress sin, repentance, and mortification of the flesh, certain older non-Western religious cults seem to have employed *Cannabis* as a euphoriant, which allowed the participant a joyous path to the Ultimate; hence such appellations as “heavenly guide.”

The North African tradition involving *Cannabis* is closely bound up with the Koranic injunction against alcohol. The cultural context of *Cannabis* use is the family tradition, in which the members gather in a special *Kif* chamber for the purpose of relating oral histories. Recent attempts to substitute alcohol for *Cannabis* amount to forced culture change, with potentially harmful effects on the traditional system.

The adoption of *Cannabis* by Mexican Indians into their syncretic traditional-Christian rituals and beliefs, especially in connection with curing, is particularly interesting since *Cannabis* is of Old World origin, introduced after the Conquest into a cultural area already strongly predisposed toward the use of mind-altering substances. It would be too much to say that *Cannabis* is replacing aboriginal sacred hallucinogens, such as morning-glories, peyote, or mushrooms. But it does appear to have taken root and even been sanctified in local areas, perhaps because more traditional psychotomimetics are difficult to obtain or, like *Datura*, are actually physiologically dangerous. Of some interest also is the spontaneous development of marihuana “rituals” in the United States, which is otherwise increasingly undergoing secularization. These rituals are in clear opposition to the cultural traditions of the larger society, which values aggressiveness and achievement as opposed to introspection and passivity.

Studies to date on *Cannabis* are inconclusive with respect to total physiological effects, especially on chronic users. Excessively large doses of hashish over a period of time may well have deleterious effects, but this would apply to a very small number of *Cannabis* users—a fraction, certainly, of the number of persons who habitually use alcohol to excess. Clearly much more research is needed, not only in Western societies, where *Cannabis* is rapidly becoming a “social drug,”

but historically in societies that have focused on *Cannabis* (and other psychotropic substances) in a ritual way. In the meantime, is it not obvious that the social costs of enforcing laws based essentially on the hysteria of the 1930's rather than on dispassionate scientific research are out of proportion to the actual or presumed harm done by this ancient euphoriant? Surely one of the most deleterious results of the law—modified recently, to be sure, but still punitive—is precisely a cause-and-effect relationship so often charged to *Cannabis*: that it leads to the use of other, more dangerous, and truly addictive drugs. The cause-and-effect relationship is not physiological, however, but social, because by having driven *Cannabis* underground the law forces young people into contact with criminal elements whose motivation is neither ritual nor altruistic but commercial.

There is an additional factor, which touches on the relationship of the dominant white society to its minorities. On a television program on drug abuse produced by KNXT, the CBS station in Los Angeles, in 1970, a young female participant from the Spanish-speaking community observed that marihuana had become so expensive that only affluent middle-class whites could afford it, while minority youth seeking momentary relief from unbearable pressures were forced by economics to resort to more readily available and cheaper amphetamines and other potentially far more harmful drugs.*

To an ethnobotanist concerned with the complex interrelationship, through time, between man and the plant kingdom, especially its numerous intoxicants and euphoriants, it is ironic that *Cannabis*, which only a few years ago was associated in the public mind exclusively with the poor black and brown minorities, should have joined the long list of social drugs of our drug-oriented, affluent, white middle-class society, while being priced out of reach of those on the bottom rung of the economic ladder. It is doubly ironic if we speculate that some of the remote Mediterranean, Near Eastern, and African ancestors of these minorities might have been among those who long ago 'used *Cannabis* as a divine plant and "guide to heaven."

* It may be recalled that it was the avowed intent of the U.S. Justice Department's "Operation Intercept" to drive the price of marihuana beyond the reach of young people by impeding its importation across the Mexican border. One could also attribute the widespread experimentation with potentially deadly, wild-growing plants for hallucinogenic purposes at least in part to the economics and legal dangers of the marihuana market. To cite only one example, a recent "underground" publication, *Herbal Highs*, by one "Maryjane Superweed," lists a number of deadly poisonous plants as psychedelics and encourages them as "legal highs." The popularity of this spurious guide is such that I was barely able to get the last copy in a Hollywood "head shop." Several of the listed plants are misidentified, as are some of the illustrations; on the whole these "alternatives" to marihuana are frightening. The author, whoever he or she may be, may be responsible for the death of or permanent injury to a number of misinformed youths.

Sacred Narcotic Water Lily of the Nile: *Nymphaea caerulea* Sav.*

by William A. Emboden, Jr.

*This article, which is presented solely for educational/research purposes, appeared in the journal *Economic Botany*, 33(1) (1979), pp. 395-407.

[[Images of *Nymphaea caerulea*](#), Blue Lily of the Nile]

A suggestion that certain water lilies might have narcotic properties is found in their frequent use as a motif in funerary art among the Egyptians as well as the Mayans. The work of Rands (1953, 1955) traced the New World distribution of water lily motifs throughout Mayan art and made important mythic associations. From the middle of the Classical period until the inception of the Mexican periods, the water lily motif is extremely common and highly varied in its representation. Rands makes the association between this tradition and that in Asiatic art.

Although Conard, in his 1905 monograph on the water lilies, speaks of the importance of *Nymphaea caerulea* Sav. in a decorative and an emblematic sense, he cannot attribute any mythic associations other than the obvious and does not mention the possibility of water lily cults. He further denies the assertions of earlier writers that the *Nymphaeaceae* have any real medicinal value or unusual chemical properties. This represents the current status of thought among most ethnobotanists, pharmacologists, and anthropologists.

In extending the earlier works of Rands, Dobkin de Rios (1974, 1977) investigated the psychotropic flora and fauna in Mayan culture and noted the frequent use of the water lily motif in association with the toad (*Bufo marinus*). These toads contain *bufotenine* in glands located near the tympanum. The substance is released in the matrix of a milky exudate when the amphibian is aroused. Bufotenine is capable of inducing profound hallucinations after breaking the blood-brain barrier. This led Dobkin de Rios to the assertion that Mayan depictions of the water lily were probably more than decorative and constituted a source for the development of a belief system that could be explained, in part, on the use of the toad and the water lily to alter states of consciousness. This hypothesis met with some hostile reactions from anthropologists, who found such a stylistic approach inadequate, even in light of the amassed evidence.

Emboden (1974) touched upon the use of *Nymphaea caerulea* as a narcotic and has been in contact with Dobkin de Rios concerning the use of the water lily flower as a narcotic. This paper explores the use of water lilies as narcotics in the old world and especially in ancient Egypt. In a future paper coauthored with Dobkin de Rios we will treat transcultural phenomena related to the use of narcotic water lilies in a comprehensive manner.

Of the several Mayan sites in which water lily motifs have been found, perhaps the most dramatic are the murals at Bonampak, which are so like some of the Egyptian murals that the similarity is startling [[Images of Bonampak Murals](#)]. The association of the water lily with the sensory modes pointed out by Rands (1953) is strongly in evidence. In one of the principal Bonampak murals, which I have seen only recreated in the Peabody Museum of Harvard University, there is depicted a dance ritual in which water lilies are associated with the noses and foreheads of some of the dancers. Percussion instruments are played and many of the dancers are masked. Trumpets are being blown as this unexplained ceremony takes place. Diaz (1977) has commented on these depictions and supports the contention that the water lily was used as a ritual narcotic. He quotes from poetry of a ritual nature that is a kind of hymn to the "precious aquatic flowers" and the "flowers that cause vertigo, the beautiful narcotic flowers." The Nahuatl term *quetzalaxochiacatl* meaning "precious water flower" may refer to *Nymphaea ampla*, according to Diaz. Supportive of this assertion is his finding a contemporary recreational use involving the crude rhizomes in Chiapas, Mexico. It was asserted that these provoked "prolonged and powerful hallucinatory effects."

Following this lead with chemical analyses, Diaz isolated aporphine alkaloids from the plants. These compounds differ from apomorphine by two hydroxyl groupings. Apomorphine is a synthetic derivative of morphine and both are classified in the United States as narcotics. Although apomorphine is probably best known for its emetic action, low doses tend to tranquilize while higher doses may induce psychoses in some individuals. Diaz also mentioned earlier analyses that identified nuciferine and nornuciferine that may play roles in the intoxication derived from eating fresh rhizomes. Mention was not made of the use of *N. caerulea* as a narcotic, and Diaz accepts the Conard thesis that this plant was used only in an emblematic sense. This paper will attempt to alter that contention.

Shamanic stratification was as important to Mayan priest-shamans as it was to the Egyptians. In both cultures, the true priests occupied centers that were forbidden to the shaman of the people who involved himself in curing and divination. The higher priestly caste carried out such activities as the prediction of lucky and unlucky days, oracular revelation and formulating spells. The *Harris Magical Papyrus*, the *Salt Magical Papyrus*, and the *Beatty Papyrus VII* are all almost totally occupied with the magic of a priestly caste, a magic that never filtered down to the common man. Vogt and Ruz (1964) have suggested the same hierarchy for the Maya, and in both instances these priestly castes were served by assisting artisans, officials, craftsmen and commentators of lesser rank, but still of a secret society.

In Egypt, real commentary begins only in the Fifth Dynasty, and, among the Maya, Vogt and Ruz (1964) have traced the origin of records to the Proto-Classic period. Both cultures built temples for private practices of priestly cults which were not open for public religious ceremonies. Festival days in Egypt brought pilgrims to the temples but not into them. Spectacles such as the avenging of the death of Osiris were staged, but these had nothing to do with the reality of the shaman-priests. Such spectacles served to strengthen the vast gap between the complex theologies at Heliopolis, for example, and the belief systems of the people. In later periods, the mortuary temples became the gathering place for secondary cults that usually developed out of veneration for real or imagined heroes who might be invoked. The "official religion" involved daily rituals on the part of temple priests. Egyptologists have remarked on the uniformity of these rituals at divergent sites. Based upon a center at Heliopolis (now Giza), the king became the personification of Horus in the worship of Osiris. Likewise, in pre-Osirian times the cult centered about the god Ra who had an origin in the blue water lily and who predated Osirian beliefs, laying a foundation for these. Ceremonies were focussed upon the linking or fusion of the king and the god Osiris. The general populace knew little more than that such ceremonies were for the well-being of their king, a condition that would reflect upon their own lives.

The elements that Rands (1953) found commonly associated with the water lily in the New World are exactly those depicted in funerary art in ancient Egypt. The death and resurrection of Osiris is symbolized in the blue water lily. *Nymphaea caerulea* blooms for three consecutive days, with its flowers borne on stalks that lift the flower about 18 inches above the surface of the water. Each day it opens at around eight in the morning and closes about noon.

The symbol of three was of great shamanic importance. Numerous incantations were tripartite, a sort of trinity existed between Osiris, Horus and the pharaoh. We are told in the legends of ancient Egypt that Osiris was murdered by Seth and his dissected body was cast into the waters of the Nile. He was made whole again by his wife and sister Isis, but variations on this legend indicate that he became the sacred blue lily of the Nile, opening with the ascendance of the sun and closing with its descent in the sky. That Osiris could be a flower, the sun, creator god, a mystical personage brought back from death, etc. is indicative of the ability of the Egyptian mind to harmonize disparate elements. His image is also to be found in the scarab beetle (dung beetle) of which the female imbeds its egg into a ball of feces and the male rolls this ball into the sun during the day and back into some crevice at night. Thus Osiris had a further alter ego in this insect. Budge (1900) found individuals in the Sudan who still involved themselves in devouring these beetles in what he alleged to be a vestige of the cult of Osiris. This was an element of "eating magic" which was a sort of communion of the most intimate sort with those elements that were godly manifestations. This leads to the assertion that I shall set forth. Because the water lily was the incarnation of Osiris, it would most certainly be devoured as was the scarab beetle. The effect of an experience such as this would be an alteration of one's conscious state or the ecstatic separation of body and spirit. I shall adduce evidence to this end.

As the propitiators at Delphi held laurel leaves in their mouths, so those who approached the temples of Osiris and Horus are depicted holding water lilies. Fortunately, tomb paintings have maintained their mineral colors, and we can clearly define the water lilies as *Nymphaea caerulea* and not another species. Schweinfurth (1883) analyzed flowers from the mummified remains of Ramses II, the princess Nzi-Khonsu, and a mummy marked "Kent." In each instance the flowers in their garlands were *Nymphaea caerulea*.

Nymphaea is first encountered in the Fifth Dynasty, becomes important in the Ninth Dynasty, and from the Fourteenth Dynasty to the Eighteenth Dynasty is almost ubiquitous. It has been traditional to treat such representations as merely emblematic or symbolic offerings. The flower is seen with comestibles in piles of offerings to the dead, on unguent jars, on the fillets making up the head bands of queens, and often in association with the narcotic mandrake, *Mandragora officinarum*. It is not the rhizome that is depicted, but always the flower. Frequently, the flower has the fruit of the mandrake drawn into its center. If the flower is to be considered as a comestible, we must remember that it is acrid and bitter. Even the rhizome was used only as famine food, and this after thorough leaching and roasting or boiling. The seed was retted away from the pulpy mass in which it was embedded and cracked so that the starchy embryo could be removed to make a kind of crude flour. We must keep in mind that many plants that have narcotic properties exhibit these in only certain tissues. For example, the opium poppy produces a highly narcotic exudate when the laticifers of the fruit are broken, and yet the seed of that same fruit may be eaten in great quantities with impunity. This suggests that a decoction of the flower of *Nymphaea caerulea* may not have the same properties as leached, cooked rhizomes or seed.

Some scholars have attempted to identify the sacred flower of the ancient Egyptians as the "lotus." This is not only inconsistent with tomb painting and descriptive early texts in which the glyph is clearly *Nymphaea*, but neither papyrus nor the lotus existed as natives in Egypt prior to about 700 B.C. when they were brought by the Assyrians. *Nelumbo nucifera*, the lotus, as both an esculent rhizome and a large seed, is also a fine food source once the bitter plumule of the embryo is removed. By the end of the 19th century the plant could hardly be found in the Nile Delta, while the indigenous *Nymphaea caerulea* was still relatively abundant. It is sad to say that, during my journey to the Nile Delta flood plains in July of 1977, *Nymphaea* was seen sporadically and seemed to be highly endangered. This is due principally to the absence of the once numerous marshes, increasing salt concentration and pollution of the drainage ditches that help to irrigate the agricultural crops. Nevertheless, the persistent botanist will find the plants in some areas outside of Cairo on the way to Giza.

The toad or frog is often encountered in zoomorphic clay lamps from ancient Egypt. These were used for burning castor oil (*Ricinus communis*) mixed with salt to provide smoke-free illumination. The hole in the top of these lamps is often surrounded by a rosette of petals forming a water lily. Again we have an association that Dobkin de Rios (1974) found with a high frequency in Mayan ceramics. The metamorphic nature of these amphibians and the possibility of bufotenine extraction and use would make them especially meaningful images. Likewise, the sacred water lily in association with the toad-frog would place it above all other floral representations, given its narcotic properties.

The *Papyrus of Ani*, better known as the *Book of the Dead*, is perhaps the most important document to emerge from the period of about 1500 B.C. to 1350 B.C. Written for the dead, these spells, incantations, and magical formulae can be traced to 1350 B.C., and some are even predynastic, according to Budge (1913). In these texts, we encounter a chapter entitled "Transformation into a water lily flower." Some have called this simply "lily," others "lotus," but, given the early date of the texts and the late advent of the lotus from Assyria, it is impossible to use such surrogates. It is essentially a magical shamanic transformation. The water lily was initially the favorite of Ra, and a product or emanation from his being. Ani wished to have the power to transform himself into the sacred blue water lily so that his body might have new birth and ascend daily into heaven. Another version of this transformation allowed Ani to transform himself into Ptah (creator god). Importantly, the accompanying vignette is a human head springing from the open flower of *Nymphaea caerulea* growing in a pool of water. The text of this is attributed to "Osiris Ani" who says, "I am the holy water lily that comes forth from the light which belongs to the nostrils of Ra, and which belongs to the head of Hathor. I am the pure water lily that came forth from the field of Ra." Later versions of the same text petition the water lily with requests for

visions and soul flight. Such supplications suggest the power of the water lily and are important stylistic clues to the chemical nature of the flower which might be used to provide such transcendent experiences.

It is worthy at this point to recall that in popular legends Ra was the conqueror of Hathor when, in a malevolent state, she was going to destroy his people. Ra enjoined the Egyptian people to make enormous quantities of beer at Heliopolis and to mingle this with their own blood and with mandrakes. The greedy Hathor drank many amphoras of this and fell into a protracted sleep of thousands of years, allowing the people of Ra to live. The legend implicates an intoxicant and the narcotic Mandragora in a tale of shamanic power. This would reinforce the contention that the contextual use of water lilies in association with sensory modes has similar implications. The proof must be found somewhere between legend and a convincing chemical profile that suggests the power of *Nymphaea caerulea* to alter states of consciousness.

In 1910 Goris and Crete indicated that they had isolated a new compound from *Nuphar luteum* (formerly *Nymphaea lutea*) which they dubbed nupharine. Not much was made of this discovery until the year 1941, when it seemed that some of the world's opium sources might be lost. It had been rumored by some earlier explorers that various water lilies might serve as an opium substitute. In 1941 Delphaut and Balansard described their experiments with water lilies. Using the powdered rhizomes of *Nymphaea alba* in alcohol they were able to induce a deep and profound sleep in mice, dogs and eels after an initial spasmolytic action.

More interesting were reports from the few individuals who had made observations on the effects of *Nymphaea* on human behavior. Mordrakowsky (as cited by letter in Raymond-Hamet, 1941) reported the flowers of water lilies to be narcotic and to provoke a hypnotic state when ingested. One of the earliest sources for such assertions came from Descourtilz who wrote in his *Pictorial and Medical Flora of the Antilles* (1822), that flowers of species found in the Antilles were "narcotic and able to replace opium." While the species in question was probably *N. ampla*, this first report gained credence when Pobeguín (1912) noted that both *N. stellata* and *N. caerulea* had the same powers. On page 49 we read, "... a decoction of the flower is narcotic." However, all investigations to date suffer from the absence of fine species characterizations and failure to note human response to utilization of floral decoctions beyond stating that a narcosis is provoked. I will describe these psychogenic effects in a forthcoming issue of *Mexican* (Emboden, in press).

From the foregoing, one element is evident: water lilies of several species and genera are able to intoxicate by inducing a hypnotic state after an initial period of neural stimulation usually reflected in nervous spasms. Would this not be the perfect trance material of the shaman? It would lead to behavioral patterns that are described for shamanic states in many and diverse cultures.

A question now comes to mind: what evidence do we have for ritualistic use of *Nymphaea caerulea* in early Egyptian dynasties? We must again work from stylistic evidence coupled with what we now know of the narcotic properties of the flowers. It has not been characteristic for most cultures to reveal the nature of their most sacred ritual materials. In ten thousand verses of the *Rig-Veda* of the ancient people of north India, we can find no specific indication of the plant that was *soma*. Scholars must work from iconographic and textual clues from many sources. One of these clues in investigating shamanic ritual and its mediators in ancient Egypt is the ritual chalices used. These are usually calcite and in the form of a water lily. They are inlaid with blue pigment or lapis lazuli and are most often found between the Eighteenth and Twenty-second Dynasties. One of these, found inside the door of the tomb of Tutankhamun, is exemplary of the distinction between the ritual chalice and the drinking vessel. This white calcite chalice is in the form of a single flower of *Nymphaea lotus*, the white water lily of the Nile. Its supporting handles are each comprised of an open flower with two buds. On its lip is inscribed a toast to long life and happiness. It is the observation of the great Egyptologist I. E. S. Edwards (1976) that cups in the form of the white water lily were used as drinking vessels, while those that represent the blue water lily were used for ritualistic purposes.

Further evidence for the use of the blue water lily as a psychoactive substance may be adduced from the famed golden shrine of Tutankhamun. In the second scene of the top register, the queen pours some liquid into a vessel from a vase in her right hand, while in her left hand she holds a water lily and a poppy. In the lower left register, the king pours some liquid into the right hand of his queen as he holds a bouquet of water lilies and poppy flowers. The one inscription between the king and queen is translated as "Adoration with offerings may the

Great Enchantress receive thee, O Ruler, beloved of Amun." Here we have an association between the two narcotic flowers in association with ritual libation. Although some have stated that "water" is being poured, it would hardly seem the most probable liquid, given the nature of the scene and its association with a shrine, although water was a great offering to the dead and important in the ceremony of "the opening of the mouth."

Unguent vases, as they have been termed, were almost always found emptied of their contents in tombs that had been looted. That of Tutankhamun was no exception. Robbers considered the contents of these vases to be more important than the vases themselves, for these were believed to contain *didi*, the elixir of life that could convey immortality. It would have been much easier to sell goatskins full of this precious fluid than the exquisite vessels in which they had been stored. One such vessel is in the Cairo collection of Tutankhamun and is elaborately carved of two blocks of alabaster. It may be characterized by the openwork calcite handles representing the union of upper and lower Egypt, balanced on a lower block of two humanoid figures and a central support. The top of this unguent jar bears the face of the goddess Hathor, who wears a necklace from which is suspended a *Nymphaea caerulea* flower with two flanking buds. From the central flower there is suspended a single narcotic mandrake fruit. Could this be a clue as to the contents of the vase? Petals of this same flower support the base of the vessel and are seen as a central collar about it. The presence of the *ankh* as a symbol of life and two metamorphic tadpoles have further shamanic overtones. It is estimated that 400 liters of such fluid was removed from this tomb alone. Is it logical to consider it a perfume or rather that which allows a man to live forever as a god? We must also question the use of the term "unguent vessel" and "unguentarium" in the catalogues of these pieces. An unguent is, by definition, a salve and incapable of being poured from vessels with small orifices. The characterization most probably came from the attempts to characterize the residue found in these vessels. Usually it was oleoresinous or it had dried into a block of dark residue. Neither of these could have characterized the fluid state of the original contents.

A single such example suffers the possibility of being unique, but we can cite many such vessels in which the narcotic water lily and mandrake are juxtaposed. One of the great ones is the leomorphic vase from Tutankhamun's tomb. This standing lion is crowned with a corona of *N. caerulea* petals, floral rosettes that suggest the stigmatic surface of opium poppy capsules, and papyrus motifs. The figure rests its left paw on the symbol for protection and stands on the same floral motifs below which is a row of mandrake fruits. The lion is part man and part beast. It is also the alter ego of the god Bes, the dwarf with a mane, ears, and tail of a lion. As the protector god, Bes wears the royal insignia of the king on his chest. Inside, remains a matrix of dried lipid of an unidentified nature. Because it was a usual practice to extract floral materials by wringing them through linen, it would be necessary to keep these volatile substances from evaporating. The most obvious solution would be to find a fat or oil that would combine with the extracts to prevent them from evaporating. While the lighter fractions would be lost in time, the fat or oil residue would remain. Gas chromatography combined with mass spectroscopy would provide important critical data on the precise nature of these remains. Gabra (1956) identified opiates in the residue of one such "unguent vessel" of the Eighteenth Dynasty. A comprehensive survey of the total composition of many vessels remains as an important piece of research.

In writing of the young Tutankhamun, biographers have noted the delicate health of the boy king. No one has indicated the exact nature of this weakness. His queen, Ankhesenamun, is depicted on the exquisite throne chair of the king ministering to him. In her left hand she holds a blue vessel in the form of an opened *N. caerulea* flower. The royal collars of both are yokes decorated with mandrakes and the blue water lily flowers. The queen wears the crown of Hathor. The usual interpretation of this scene is that the queen is anointing her king with perfume. Is this possibly an offering of a medicament as understood in the terms of a thing of power? We are compelled to recall the famous limestone depiction of King Semenkhkara and his consort Meriaton who are "promenading in a garden." In this latter depiction the King leans on a staff or crutch, as his consort offers two mandrake fruits and the bud of *Nymphaea caerulea*. In her left hand she holds one more bud and two open flowers from the same sacred blue water lily. This dates to approximately 1343 B.C., while the throne chair of King Tutankhamun was executed after his marriage and before his premature death in 1343 B.C. Both scenes suggest to me some ritual healing involving these sacred narcotic plants.

Perhaps that which seems lacking is a broader shamanic context in which to place the blue water lily. A few more examples may suffice to illustrate this assertion. In the tomb of Amenemhet at Thebes there is a fresco

showing a sacrificial bull being led to the funeral slaughter. A woman holding three water lilies leads the procession. Sacrificial bulls were garlanded with blue water lilies and mandrake fruits. One interpretation of this has been that both give a pleasant scent. This is true but does not explain why these two should be selected out of the vast fragrant flora of the Nile region and should so often be used in conjunction with the opium poppy. Also in the tomb of Menna at Thebes a funerary voyage of the dead takes place on a ship the bow, stern and rudder of which are figured as water lilies. The Egyptologist Mekhitarian (1954) states, "We must never lose sight of the fact that the choice of motifs in Egyptian pictures, even in those which seem to have no connection with religious subjects, is always guided by ritual considerations."

In the Theban tomb of Nebamun and Ipuky, we encounter a widow with bared breast squatting before the anthropoid figure of her coffered husband. She pours dust on her head as a ritual gesture of grief. Springing from the base of the figure is a column of blue water lilies and poppy capsules bound together and topped with three palm fronds. Again, it is difficult to imagine that the combination of the narcotic poppy and blue water lily is merely fortuitous. As for the palm, it was the source of palm wine that could have provided a solvent for the poppy and water lily derivatives. It is worthy of note that these capsules have been "milked" for their opium as indicated by the vertical slashes on the capsules. This also establishes the poppy as *Papaver somniferum* and not one of the other non-narcotic species of the area.

In the tomb of Userhet at Thebes, we see another fresco in which a goddess arises from a lake and pours a magical fluid into golden cups. Mourners wear resinous, scented mourning cones on their heads. From the cones blue water lilies extend over the forehead. The fluid is indicated by wavy lines. Is this an elixir of forgetfulness that may be obtained from the aquatic water lilies? We know that such a painting was not merely decorative but of a magical order. It has been said that these representations, dictated by a priestly caste, are hieroglyphs written large.

Most depictions of the veneration of the god Ra-Harakhte or Horus show the propitiators offering the god a vessel covered with a water lily. Possibly the *Nymphaea* is a clue to the contents of this vessel. The god Horus was known as "the healer" and as such was venerated. One fine example of this is to be seen in the limestone stela of Upuaut-mes of the Nineteenth Dynasty.

Sennofer was curator of gardens and parks during the reign of Tuthmosis III (Eighteenth Dynasty). He and his sister Merit were beloved of the Pharaoh and, thus, were buried in a regal fashion at Thebes. In his tomb, a fresco depicts him seated in the tree of heaven with Merit kneeling next to him. Before him is a table with three vessels. Each is in the form of a water lily bud; the central one is partially open. Around each is wound the peduncle of the flower terminating in the flower proper. Above these are three water lilies; the central flower is open. In his left hand, Sennofer holds the water lily before his nostrils. This was a gesture that was believed to lead to the purification of the nostrils. In his right hand is a stylized water lily chalice. This is perhaps the most comprehensive depiction of *Nymphaea caerulea* associated with any figure in a tomb painting. One cannot argue that Sennofer was a commoner for his tomb and its frescos reveal the esteem in which he was held during his lifetime. In death, he sits on a chair with the legs of a lion and supported by the tree of heaven which confers immortality on those resting there. His attitude is that of a pharaoh. Had he been a commoner, his fate would have been to be salted in natron and relegated to obscurity.

We are left with the inescapable conclusion that the blue water lily, *Nymphaea caerulea*, was exploited for its narcotic content in order to provoke the shamanic state of ecstasis among a priestly caste in ancient Egypt. These initial observations and comparisons with recent investigations into similar New World traditions may lead to a very different way of viewing Egyptian art and artifacts and may provide new insights into the mysteries of a priestly caste in that great ancient civilization. In a future paper, the author will adduce further evidence to support the contention that water lilies in the Old World and in the New World were important vehicles of shamanic ecstasis and have been disregarded in this context of use.

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NARCOTIC PLANTS

Revised and Enlarged

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HALLUCINOGENS

*"We are such stuff as dreams are made on; and
our little life is rounded with a sleep."*

*William Shakespeare, The Tempest
Act IV, Scene 1*

OF THE FIVE CLASSES OF DRUGS defined in 1924 by Lewis Lewin, hallucinogens (psychotomimetics) fall into the intriguing category *phantastica*. The plants in this group are those that act upon the central nervous system to produce a state in which there is an alteration of time, consciousness of self, space, and perception of the physical world. Sensory displacement may accompany a voyage into the realms of the fantastic and there may be acute sensitivity to color and hearing. Sometimes these sensations are divided into the categories of auditory, visual, and tactile hallucinations, but synesthesia may accompany this experience and one sensation is altered or displaced by another, or the senses become temporarily interchanged. A perfume becomes red and the sound of a bell in the distance is a vivid blue. The touch of a piece of silk may produce the sensation of a color comingled with a fragrance and a most unusual perception of time and place. Polymelia, the sensation of having many limbs or digits, is not unusual in extreme hallucinations. Past events may be re-created with an alarming range of detail, and it is possible to transcend the physical and mundane, even leaving the corporeal body for a period of soul flight, spirit flight, levitation, or what has been called astral projection. The world of *phantastica* is a world in which all things are possible. It is no wonder that the opulence of late-nineteenth-century French writers such as Theophile Gautier and Baudelaire has imbued prose and poetry with a peculiar lustre that is ultimately tied to the world of hallucinogenic plants.

There is an ever-continuing vocabulary that attempts to define the elusive states characterizing hallucinations; none seems quite satisfactory. We know that certain plants produce a restricted syndrome of hallucinations such as visual or audio, while others seem to display their capacities in a pyrotechnic fashion in which one state merges mercurially into another. By 1932 the French neurobiologist Raoul Mourgue had analyzed over 7,000 publications on hallucinations in *The Neurobiology of the Hallucination*, and he concluded that all of the data analyzed from these sources could not provide him with a theory of hallucinations. Neurobiologists continue to probe the poorly understood world of the mechanisms

of psychotomimetic plant drugs in an attempt to understand their mode of functioning. The ethnobotanist, on the other hand, seeks to identify the plants capable of producing such profound altered states of consciousness and put them into some meaningful historical context. The ritual use of hallucinations has been the subject of several symposia volumes in the last decade in which an attempt has been made to identify the plant hallucinogens with the myths, rites, and magic that have given them the position of providing shamanic equilibrium, in a psycho-social sense, in diverse cultures. Thus, our understanding is being broadened by a collaboration between chemists, botanists, anthropologists, psychologists, and sociologists. After all, it is a task of the investigator in this realm to attempt to separate the learned psychodrama of a culture from the behavior produced by a plant drug. One of the great collaborations of this century is that of Dr. Richard Evans Schultes of the Harvard Botanical Museum and Dr. Albert Hofmann of the Sandoz Laboratories in Basel, Switzerland. Together these two scientists in 1973 produced the first book to effectively survey *The Botany and Chemistry of Hallucinogens*. It is collaborations such as these that are going to produce a new understanding of a complex subject that has been much misinterpreted.

Geneticists and physiologists are coming closer to an understanding of some of the aspects of the mass of neural circuits called "mind." As with every other function of man, the mind is under chemical control, and there is a chemical basis for the ardor and passion of lust, the subtle sympathies of love, the rage of tyrants, and for "sleep that knits up the ravelled sleeve of care." The use of hallucinogens in an attempt to "expand consciousness" and to probe subconscious states of mind seems an inevitability. A general lack of information has led to an assumption on the part of the public in general that this is the first generation that has had to cope with the complexities of pursuing altered states of consciousness. It is the hope of this author that a historical overview of hallucinogens in world cultures will provide the sort of understanding that may lead to further inquiry rather than judgements. For the moment our lack of precise information on the long-term effects of these psychotomimetics would suggest caution.

It was simpler even a decade ago to state the number of hallucinogens in the Old World versus the New World, but abundant interest in the area of ethnobotany is constantly revealing to us new species of plants in both of these areas that have been used to induce hallucinations. Although it is a consensus that the New World provides substantially more hallucinogens than the Old World, recent investigations into the defunct civilizations in areas such as ancient Assyria, Egypt, and Greece are providing interesting clues into the provoked experience in these ancient civilizations. "The Mysteries" that were those of Eleusis and of temple priests in Babylonia, Mesopotamia, Assyria, and Egypt may be more than the mere ritual and verse that has been invoked by archeologists and anthropologists.

Of the more than 600,000 plant species known to man, about one in ten thousand of those analyzed chemically has revealed a principle that would qualify it as a hallucinogenic plant, but the search goes on. We also are confronted with the dilemma of why certain plants have been historically selected as agents for inducing hallucinations while other plants available to that same culture have been ignored,

even though they may have the same potential, and in some instances may have fewer associated toxins.

It is an important observation that unlike the other categories discussed in this book, the true hallucinogens are non-addicting. They may produce the aforementioned disordering of the senses and create a disruption of the ego, but they do not create physiological habituation. I cannot see it as a process without possible hazards, for in probing into the recesses of the mind, in reshaping modes of thought, in repressing the ego and extending experience into undreamed of realms, the individual who is unprepared psychologically may experience a crisis of considerable dimensions. And yet, by contrast, some of these plant drugs have been the most useful adjuncts to therapy in recalcitrant patients who could not otherwise yield to the experiences of psychic extension. In antiquity the shaman was the guide for spirit flight and in some areas of the world he still is. In contemporaneous Western society the physician and the psychotherapist must serve as shaman-guide.

Dr. Alexander Shulgin stated in a symposium on psychotomimetic drugs that sanity is a statistical thing determined by a group of three; it is a minority concept. I find this concept intriguing, for it eliminates "the real world" and relates reality to a society, a time and a place in that society, and a judgement from the majority. Anyone who has used a potent hallucinogen knows that reality becomes a very subjective thing. The paradox is that the intensity of this reality may far exceed the non-provoked reality, or what some might define as a "normal state of being." Perhaps the use of a hallucinogen is a part of the normal, and is a part of being human. Psychotropic means literally to turn the soul or mind, to change the psyche. Is this not a normal human function, and if induced, is it abnormal? Are we not, as Shakespeare tells us, "such stuff as dreams are made on"? Can man endure an unchanging realm of conscious behavior without respite? History would seem to say no.

There is only limited authoritative information on the mode of action of those principles that have been identified as hallucinogenic. In some instances it is thought that the active principle forms a secondary compound in the liver by combining with a protein, in others a hallucinogen is activated by being ammoniated or methylated in the body and exists only as a hallucinogenic precursor before that. In other cases the psychotomimetic is thought to interfere with normal oxidative processes in the brain. Recent efforts indicate the accumulation of materials such as serotonin, normally broken down by the transmission of nerve impulses, that act as a hallucinogenic agent. Some chemicals in this group would seem to break neural synapses or render transmission across them an impossibility. All of these processes are probably extant in different systems, for the chemicals that facilitate such physiological and psychological responses are as diverse as the plants producing them.

In order to systematize the survey of the many hallucinogenic plants of the world, I have thought it best to order them geographically, as an alternative to a chemical ordering or a botanical arrangement would presume too much on the part of the reader. I also believe that this arrangement may be more historically meaningful.

TROPICAL ASIA

A frequent misconception regarding early explorations is that their purpose was to provide spices for European tables; in reality, this trade sought sandalwood, pepper, opium, rhubarb, and aloes not for gourmand palates, but as narcotics, aphrodisiacs, and, most important, medicines. From the ninth to the fifteenth centuries, Venice controlled the trade, having defeated her Genoese competitors. With the fall of Constantinople in 1453, the Portuguese entered the trade and monopolized markets for the next century; during this period the Spaniards sponsored Columbus, who, looking for a trade route to India, stumbled upon America. When in the seventeenth century the Dutch held supremacy of the seas, they initiated ruthless tactics to gain a monopoly of the drug trade. Islands not under Dutch control were plundered for their spices and drug plants, and the few remaining plants were destroyed so that subsequent invaders might not have access to them.

For sixteen years the Dutch entrepreneurs controlled the entire market of nutmeg from Amsterdam. This was a very precious commodity, its seeds being regarded as a medicine of enormous merit. So precious were nutmegs that carved wooden replicas were sold to the ignorant via a black market. Slaves on the ships bringing nutmeg to Europe were castigated for consuming part of the cargo. They knew that a few of the large kernels of the nutmeg seed would relieve their weariness and bring euphoric sensations of an other-worldly nature accompanied by pleasant visions. Nausea and dizziness often followed as the price for this respite from reality, whether the nut was grated and eaten or made into a snuff. The more practical mind of the European saw this seed as a potential medicine and did not hesitate to administer it in the event of severe illness. On that day in February 1685 when the feeble King Charles II was felled by a clot or hemorrhage, one of the numerous unsuccessful attempts to revive him included a decoction of nutmeg. His death a few days later did nothing to detract from the reputation of nutmeg as a very useful drug. Nutmegs encased in silver were worn at night as an inducement to sleep. Aphrodisiacal properties were ascribed to them, and they became a standard element in love potions. In London the rumor spread that a few nuts would act as an abortifacient. A miraculous plant indeed! The ladies who procured abortions were called "nutmeg ladies."

Myristica fragrans is the Latin name for the nutmeg tree, which attains a height of sixty feet and has small, heavy-scented yellow flowers (Pl.17). These dioecious trees are native to the Banda Islands, which were formerly known by the name Nutmeg Islands. It was not until 1512 when the Portuguese reached Banda that nutmeg became known to the Western world. At maturity a pendulous fruit resembling an apricot splits to reveal a dark brown seed about an inch long and covered by a crimson arillus fingering around the seed. The arillus is easily separated from the seed and is known in the spice trade as mace, a delicate condiment. Whole nutmegs minus the seed coats contain fifteen per cent volatile oils; these impart its characteristic flavors.

Hallucinogenic effects from nutmeg were not recorded until 1576, when Lobelius in his *Plantarum seu Stiripium Historia* described a "pregnant English lady who, having eaten ten or twelve nutmegs, became deliriously inebriated." She had undoubtedly heard rumors about the efficacy of nutmeg as an abortifacient: it was fortunate that she did not die from the experience, for a large dose of nutmeg may be lethal. In 1829 the famous biologist Purkinje ate three nutmegs and compared his experience to that of *Cannabis* intoxication (it is interesting to note that this famous biologist was obviously familiar with the effects of *Cannabis* euphoria). Drowsiness seems to accompany the delirium, which may last up to thirty-six hours.

Some doubt has been expressed that nutmeg has ever been a culturally important hallucinogen, but a *Materia Medica* published in Bombay in 1883 indicates that "the Hindus of West India take *Myristica* as an intoxicant." Further evidence derives from an Ayurvedic name for nutmeg, *made shaunda*, which translates as "narcotic fruit." It is well known that nutmeg is mixed with betel nut and snuff in certain parts of southern India. Restrictions against the consumption of hashish in Egypt are reported to have led to the substitution of nutmeg, according to a recent book on poisons. My own observations in Alexandria and Cairo would indicate to me that there is a ready supply of hashish in the streets, and no nutmeg substitution would be necessary. In rural eastern Indonesia, powdered nutmeg is used as a snuff. None of these reports suggests any ritual or religious use for nutmeg. It would seem only a temporal escape. Perhaps the most common use of nutmeg is to be encountered in prisons where other drugs may not be readily available. Some prisons have now dropped nutmeg from their list of kitchen condiments. In most instances it seems to be adopted where the drug of preference is unattainable. The usual side effects include headache, nausea, vertigo, tachycardia, and constipation, making it a less desirable drug than many others.

The response to nutmeg intoxication is extremely diverse. Some individuals experience a profound distortion of time and space and actually have visual hallucinations. These are not so predictable as with hashish, mescaline or LSD. Auditory and tactile hallucinations are not uncommon. Some reports indicate that the participant felt nothing, including the undesirable effects. Perhaps a part of this is predicated on the amount used and the freshness of the material. It is known that nutmeg deprived of its oil fraction has no effects, and nutmeg as purchased in containers in a powdered form is often old and the oils have volatilized or oxidized. Freshly grated nutmeg produces the most profound intoxication. It is the aromatic ethers that seem to be the most likely source of hallucinations. These may be derived from either *Myristica fragrans* or *M. malabarica*.

The mode of action of these aromatic ethers remains obscure. Myristicin constitutes four per cent of the oil of the nut, and twenty-five per cent of this fraction is elemicin, which can be degraded to two potent hallucinogens, TMA (trimethoxy amphetamine) and MMDA (3-methoxy-4, 5-methylenedioxy amphetamine) merely by becoming ammoniated in the body. Crude nutmeg and myristicine (a synthetic) have both been shown to produce a degree of monoamine oxidase

inhibition in both in vivo and in vitro testing. Since separate fractions of these aromatic ethers have been tested in human subjects and have shown less effect than a combination of two or more, a synergistic activity has been proposed. In laboratory animals large doses of nutmeg have revealed diseased livers upon autopsy.

In vitro studies have demonstrated the conversion of oil of nutmeg to amphetamines, but as yet it has not been shown to occur in vivo. While the elemicin and myristicin fractions seem the most likely candidates as "pro-hallucinogens," it may be that these two act with another fraction of the oil, perhaps safrol. Safrol is the predominant fraction in the oil of saffron taken from the female parts of *Crocus sativa*. Saffron was used not only as a condiment and a dye, but was regarded as a medicinal narcotic in the ancient Mediterranean and was used in the form of a tea to put unruly children to sleep. If the safrol fraction undergoes demethoxylation, it produces the well-known narcotic MDA (methylenedioxy amphetamine). It has led some chemists to characterize these fractions of nutmeg as the naturally occurring amphetamines, although they are only precursors.

In southeast Asia, especially in cosmopolitan cities such as Bangkok, Thailand, there is a plant product sold as a substitute for opium under the names *mambog* and *kratom*. The plant, *Mitragyna speciosa*, is a member of the coffee family, Rubiaceae. It has a shrubby form, with dichotomous branches terminating in yellow balls of flowers (Pl. 18). *Kratom* is a leafy material that may be smoked like *Cannabis*, and *mambog* is a thick syrup made from the leaves. It is difficult to estimate the antiquity of *kratom* use in tropical Asia, but we do have a report from the year 1895 indicating that the leaves were being sold in the "Straits Settlements" (Malaya) as an opium substitute and as a withdrawal agent. Leaves are either chewed when freshly picked, smoked when dried, or go into the production of *mambog*.

The chemical that acts on both the central nervous system and the sympathetic divisions of the autonomic system has recently been identified as the indole mitragynine. Effects of *kratom* are a pleasant reverie comparable to altered states of consciousness achieved by using hallucinogenic mushrooms such as *Psilocybe* or a small dose of LSD. The chemical skeleton of this organic compound is very similar to the latter. Evidence to date does not indicate that *kratom* is addictive, but it is habit forming. Extended use of *Mitragyna* derivatives results in emaciation, a distended stomach, pallor, darkened lips, dry skin, numbness in peripheral areas, twitching, and anomalous cardiac disorders. Although the primary action on the central nervous system is attributed to mitragynine, which increases the excitability of the medullary portions of the brain, the following eight alkaloids have been isolated may contribute to the characteristic syndrome: ajmalicine, corynanthedin, isomitraphylline, mitraphylline, paynantheine, speciophylline, speciofoline, and speciogynine. The *trans* configuration of mitragynine is of especial interest in that this form of mitragynine is analogous to other psychoactive compounds, such as psilocybin and psilocin from *Psilocybe* mushrooms and lysergic acid amide found in ergot and baby wood rose. In its ability to excite the motor centers of the central nervous system, the preparations of *kratom* and *mambog* suggest cocaine-like functioning. Clearly, this is one of the most complex of the hallucinogens.

TEMPERATE ASIA

In 1972 James H. Sanford of the Department of Religion, University of North Carolina, presented a fascinating account of Japan's "laughing mushrooms" and linked these to some equally curious mushrooms and behavior associated with their consumption in China. His interest began with the reading of a tale of a collection of medieval Japanese folktales. These eleventh-century tales, characterized as folk history, present in Volume Five a story of woodcutters from Kyoto who lost their way in a mountainous region. They encountered in the wilderness a group of four or five Buddhist nuns who were dancing and singing and perceived them to be demons because of their erratic behavior. Upon questioning the women, they were told that these were indeed nuns who had also strayed and, becoming hungry, had roasted and eaten some mushrooms, whereupon they began to laugh and dance about. The woodcutters were both astonished and hungry. The nuns readily shared their mushrooms, and all became giddy, laughing and dancing about together. The mushrooms were called from that time on *maitake* or "dancing mushrooms."

This tale led to Sanford's investigation of possible subsequent accounts of such unusual behavior and the mushrooms causing it. Among other things, he was able to conclude that the tale dated to about A.D. 1000, and the mushrooms were either *Paneolus papilionaceus* or *Pholiota spectabilis* (Figs. 28 & 29). To these he adds the identifications of Imazeki and Hongo, who speak of *waraitake* (the laughing mushrooms) as *Paneolus papilionaceus* and another form of dancing mushroom as *Gymnopilus (Pholiota) spectabilis*. These authors also mention a false "dancing mushroom," *Psilocybe (Stropharia) venenata* or *P. (S.) caerulescens*, since all intoxicate in a similar manner. *Paneolus papilionaceus* was a mushroom identified by Heim as the ingredient being used by witches in Portugal. Furthermore, the same species has been used in the United States for some time for deliberate intoxication; a sort of cheap drunkenness.

Sanford did not terminate his research with the Japanese tale, but read a Chinese work of the Sung period by Yeh Mengte (1077–1148) in which he found a cure for the uncontrollable fits of laughter caused by eating the maple-tree fungus. The cure was eating muddy earth, but more interesting is a Chinese hallucinogen associated with the maple tree and with the sort of laughter reported in the Japanese tale. The Chinese tale was set in the valleys about Mount Ssu-ming in southwestern Ceking Province, an area closely associated with the T'ien T'ai sect of Buddhism. The mushroom goes unidentified except for its characterization of *chün*. Sanford also located a source for the "laughing fungus" in a work of 1619, which translates as *The Five Fold Miscellany*. This and other later sources seem to add little to the possibility of a deliberate and contextual use of the fungus in either Japan or China. Perhaps this is the lead into an investigation that might provide a relationship between the mushroom and instances of some ritual intoxication.

Cannabis is one of the most ancient hallucinogens of mankind, having been employed by the Chinese over eight thousand years ago (Pls. 19, 20, & 21). Today it enjoys the widest distribution of any of the psychotomimetics and perhaps the



FIG. 28:
Paneolus papilionaceus

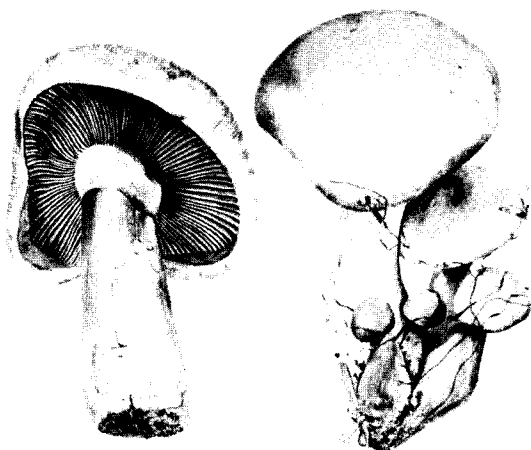


FIG. 29:
Pholiota spectabilis

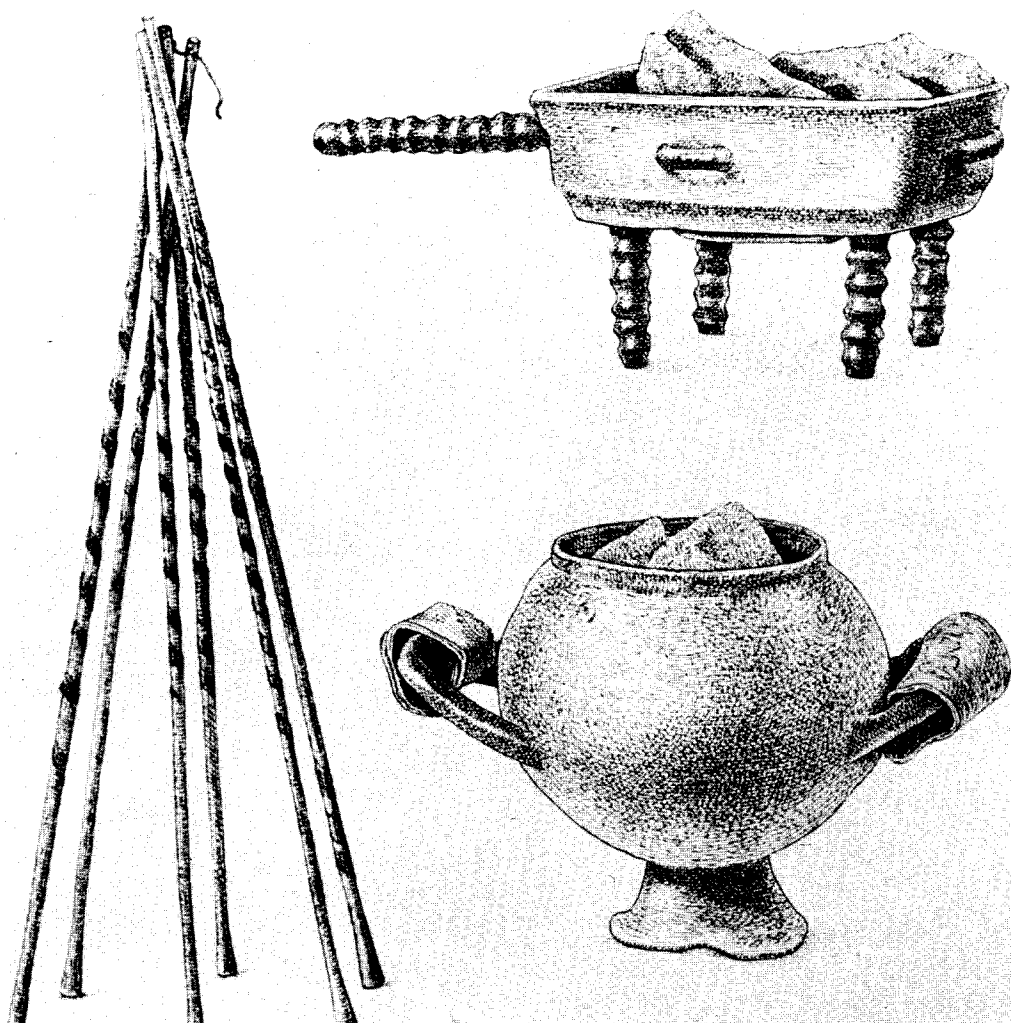


FIG. 30: Scythian *Cannabis* vessels and stakes for vapor tent

widest acceptance in a social, if not legal sense. The ancient Scythians and Assyrians used it to produce an intoxicating smoke that was not burnt in a cigarette, but in a vessel under an animal skin where the intoxicating resins could volatilize and be inhaled (Fig. 30). We have evidence from early Scythian sites as well as the testimony of the historian Herodotus, who referred to the funeral ceremonies of the "howling Scythians." These people built fires and heaped the smouldering coals with *Cannabis* plants which were covered by a sheepskin quilt. Participants would lift the skins and inhale the fumes. The Sanskrit *Zend-Avesta* first mentions this material in 600 B.C. In India the use is as old as soma. Under the name *bhanga*, it was one of five sacred plants employed in magical rites to permit freedom from distress and protection from enemies. It was consumed as an intoxicating drink in both

Thrace and India. Galen speaks of "a warm and toxic vapor" produced by eating the seedcakes of *Cannabis*. In the year A.D. 220 we have records of the celebrated Chinese physician and surgeon Hua-T'o performing surgery with *Cannabis* resin in wine.

Hashish, or hasheesh, is the resin obtained from the glandular leaves and floral parts of the female *Cannabis* plant. The term has been derived from the name of a Persian from Hashishin Tus. Al-Hasan ibn-al-Sabbah (A.D. 1124) was tutored in the Batinite tradition and was expected to become a missionary for the sect of Ismailites. A strongly charismatic figure, he drew dissenters from orthodox Moslem thought to his sect of "the New Word" or the Hashishins, from whence we derive the term assassin. It would not be necessary to pursue this history if it were not for the popular belief that Al-Hasan had his followers perform ugly deeds under a *Cannabis* madness. His movement was essentially religiously motivated, and his followers were no more murderous than equally zealous Christians in support of their faith of the new word. Most of the information that we have about Hashishin and his religion comes from descendents of the Mongolian Hulagu, who in 1256 seized the mountain fortress of this cult as well as their fortresses and palaces in Persia and destroyed all books and records of this sect. We do know that this sect was responsible for the founding of hospitals, observatories, and universities. Unfortunately, the name of Hashishin will probably remain associated with murders and *Cannabis*, while his noble deeds are already forgotten.

The word marijuana (marihuana) is derived from the Portuguese *maran guango* and connotes intoxication. Marijuana is perhaps the most popular term for *Cannabis* in the English-speaking world, although synonyms of popular origin in current use now number well over twenty. Sara Bentowa, of the Institute of Anthropological Sciences in Warsaw, has studied the philology and etymology of *Cannabis* from ancient times and compiled over one hundred synonyms for the plant prior to 1936.

There has been considerable controversy over the question of species in the genus, just as botanists of an earlier time debated over the disposition of *Cannabis* into the proper family. While it is now accepted that *Cannabis* is in the family Cannabaceae, it is the contention of a few botanists that there is but a single species in this cosmopolitan genus, that being *C. sativa*. Most taxonomists who have studied the genus recognize at least three species: *C. sativa*, the tall (6–25 feet) plant of northern areas used predominantly for the fiber in its stem; *C. indica*, a low-growing bush of a more southern latitude and high in intoxicating resins; and *C. ruderalis*, a small unbranched invader of other crops in northeastern Europe. This polytypic concept of the genus originated in the eighteenth century with the famous biologist Lamarck and was extended by the Russian botanist Janishevsky in 1924.

The issues surrounding the use and abuse of *Cannabis* are so complex that perhaps the only way in which they might be understood is in terms of historical uses in different areas of the world. In ancient China it was predominantly a medicant for gout, female disorders, rheumatism, malaria, beriberi, constipation, and absentmindedness. As already indicated, it found a place as an anesthesia. Greece had a word for smoking this plant, *cannabeizein*. This often took the form of

volatilizing it by placing the resinous top in an incense burner in which myrrh, balsam, and frankincense had been mixed, this in the manner of the shamanic Ashera priestesses of the pre-Reformation temples in Jerusalem, who anointed their skins with the mixture as well. This is possibly the material of the priestess at Delphi.

Democritus (ca. 460 B.C.) knew the plant as *potamaugis*, which was drunk in wine with myrrh to produce delirium and visionary states. Democritus wrote of the immoderate laughter that followed a draught of this decoction. It is of interest to note that Democritus was called "the laughing philosopher." Theophrastus (371–287 B.C.) gave one of the first botanical accounts of the plant under the name *dendromalache*. It was used by the Thracian Getae, a nomadic group, in the sixth century B.C. Their shamans, known as the Kapnobatai, used the smoke to induce visions and oracular trances. Among the Turko-Tartar peoples, shamanic ecstasis played an important role in healing as well as funeral rites, and it has been thought by some that the "howling" reported by Herodotus among the Scythians was characteristic of the shaman or psychopompus. *Cannabis* trances provided the shaman with a spiritual guide to the netherworld.

The Iranian word for this plant was *bangha* and simultaneously referred to mushroom intoxication and *Cannabis* intoxication. Among the ancient Persians, the living as well as the dead could commune with Zarathustra through the intervention of *Cannabis*. From the Iranian tradition the plant found its way to India, where it was not indigenous. It soon became inseparable from religious ceremonies in which it was the "heavenly guide." *Cannabis* intoxication allowed the confused mind to become clarified and the senses to focus on the Eternal. Mixtures of *Cannabis* resin were used before reading holy writ or entering sacred places. This drink called *vijaya* is now often a small amount of resin in milk with various admixtures. The purpose is to attain the celestial union between man and God that cannot be attained in a state of mundane preoccupation. *Vijaya* was the favorite drink of the god Indra, given to man so that he might attain elevated states of consciousness. It seems likely that the route to Africa was by way of India, but it may have been through Saudi Arabia. We know that it was used in the Valley of the Zambezi in pre-Portuguese times (before A.D. 1500). Two uses were preeminent: a smouldering fire was banked with the plants, and the users, prostrate around the fumes, inserted reeds into the smoke and inhaled. The Dervish tradition was to mix *Cannabis* resins with various seed oils and drink the mixture to produce a trance that would provide a revelation. In the Belgian Congo the Balubas were united as brothers-of-*Cannabis* (*bene-Riamba*) when their leader did away with the many different tribal gods of the various territories and provided a union in this wondrous plant. It was smoked in gourds one meter in circumference. In North Africa where *kif* is the name by which the plant is known, it is carried in a pouch of several compartments containing various grades of *Cannabis*. Degrees of esteem or friendship are ascertained by the quality offered. The *kif* room of a house is an essential piece of architecture, for it is in these rooms that oral traditions are passed from generation to generation in a relaxed atmosphere provided by *kif*.

North Europe had a long tradition of using *Cannabis* fibers, whereas the use of

the resins is fairly obscure until around 1800. When Napoleon's battered armies returned from the Egyptian campaign, they brought hashish with them. Although the custom of using the resin was not immediately assimilated, it soon became popular in asylums for quieting unruly mental patients. It was, about mid-century, taken up by a group of writers and artists who founded *Le Club des Haschischins*. This elitist group met in the elegant Hotel Pinodan on the fashionable Ile St. Louis in an atmosphere of chimerical phantasmagoria that would lend itself to hallucinatory experiences. Dr. Moreau, who in 1841 began to treat the mentally ill with hashish (with great success), was the primary officiant at the monthly meetings. From a crystal vase he would dispense a spoonful of green hashish paste, pronouncing the dictum, "This will be deducted from your share in paradise." These monthly meetings were held regularly and conducted with the formality of a religious service. The intoxication that followed had many manifestations, but as Baudelaire pointed out, it would be within the confines of a man's physical and moral temperament, "Hashish will be for a man's familiar thoughts and impressions, a mirror that exaggerates, but always a mirror." It is the ceremonial aspect of this practice that makes it so very interesting. Is an elitist group of intellectuals sharing their ecstasies really so far removed from the shared ritual of the "howling Scythians"?

In 1963 the Mexican ethnologist Roberto Williams Garcia published a paper on *Cannabis* as "santa rosa" or "the herb which makes one speak." Among the Tepecanos in northwest Mexico, it was reported by Lumholtz in 1902 that *Cannabis sativa* was used under the name "rosa maria" when peyote was not available. Likewise, the Tepehua living in the mountains of Vera Cruz, Hidalgo, and Puebla use the "santa rosa" in a ceremony that is as elaborate as any religious activity that may be imagined. Prayers, music, rhythmic movement, dancing, and whistling all figure into this service in which *Cannabis* intercedes with the Virgin Mary as an earth deity. It is thought to be alive and is equated with the sacred heart of Jesus, which is displayed on an altar where the herb is sanctified. Were it not for the ritual use and praying, it is believed that the plant could steal a man's soul and make him sick, perhaps even kill him. It might produce a "fleeting madness" that could only be controlled by a shaman. If venerated and used sacramentally, however, it cures and intercedes for the sinner.

In conjunction with the above, it is interesting to note the sacramental aspects of the plant's growth in montane Oaxaca. Here we find as much ritual as in the use of the plant as a sacrament. The high altitude and volcanic soils produce a particularly potent strain of *Cannabis*. The intense ultraviolet light may be responsible for converting some of the inert cannabinoids to the active delta-one isomeric form. Agricultural traditions here are ancient, and we have no date for the advent of *Cannabis*. It has been suggested that it is post-conquest in this area, but that is by no means a certainty. *Cannabis* does not flourish in such extremes of climatic and edaphic pressures, rather it grows in a "tortured" fashion. This is further exaggerated by severe pruning and by pinching out the young shoots to form the plant into an urn shape. In establishing this form the resins containing the potent cannabinoids volatilize and recondense within the confines of the plant form

until it is encrusted with the narcotic material. This brings about hormonal changes in the plants that turn them to a bright red to red-purple. The plant looks like anything but *Cannabis*. As the blood-like color begins to appear, and the plant shimmers with crystalline resins, it is "crucified" by having two wooden splinters driven through the basal stem in the manner of a cross. The association between this practice and the aforementioned association between the plant and Christ is hardly fortuitous. These syncretic Christo-pagan religious traditions are suggested by the urn-shaped "heart" of red, the crystals that shimmer like traditional shamanic rock crystals, and the ritual crucifixion after which the plant is pulled from the ground and hung upside down. Even if the Indian is at this time concerned primarily with the potency of the resins, the religious implications are inescapable. This does not constitute the hashish that is exported, but an indigenous sacramental material.

There was a time when the resins of *Cannabis*, in a tincture, were a valuable medicine easily obtained in any drugstore. As recently as 1930, it was legal to utilize *Cannabis* and its derivatives in all but sixteen states, but the Tax Act of 1937 implemented such rigid controls that it was effectively eliminated from most pharmacies. The Federal Bureau of Narcotics was established in 1930 and yet little was done between 1930 and 1937, and it seems that marijuana was not considered a problem of any consequence. The era of prohibition of alcohol was in full swing. The Treasury Department reported in 1931 that "publicity tends to magnify the extent of the evil." Shortly thereafter the repeal of prohibition laws led to a greater interest in eliminating marijuana. By 1936 there was no indication that patterns of *Cannabis* use were changing, but priorities had shifted and the Federal Bureau of Narcotics spoke of "the urgent need for vigorous enforcement of cannabis laws," and with this they initiated the infamous "educational campaign" in which the plant was suddenly dubbed "the killer weed" that induced "reefer madness." Newspapers also changed their priorities, and the stories fed to them of mass murders, rape, and insanity were published widely and often repeated as evidence of the enormous danger. Posters were distributed to schools, and anonymously authored films depicted lives ruined by *Cannabis*.

One bit of irony is that in the formulation of laws by various states against *Cannabis* it is evident that many of the legislators were unsure of the plant that they were prohibiting. These laws were enacted in addition to the Uniform States Laws Conference of 1932. Thus, *Cannabis* can be found as "locoweed," "peyote," and even as "mushrooms." Most states prohibited marijuana under the Uniform Narcotic Drug Act along with opiates and made the penalties commensurate with opium use. Ironically, marijuana is not considered a narcotic under federal law, but as late as 1960 Commissioner Harry Anslinger gave testimony before the House of Representatives that marijuana use led to a "sort of jaded appetite." He mentioned New York and Los Angeles as being the centers of the problem and stated, "They start on marijuana and . . . well, they switch to heroin."

By 1962 the White House Conference on Narcotic and Drug Abuse heard testimony from senators and judges who resented harsh and unrealistic penalties and the extreme injustice of the existing laws. By 1967 the President's Commission

on Law Enforcement and Administration of Justice suggested that the hazards of marijuana were exaggerated and that long criminal sentences were unjust. It became apparent that the legislation was more harmful to society in its enforcement than the problem it was designed to control. If the average taxpayer was provided with an inventory of court costs and criminal maintenance costs, there would be a national scandal of unprecedented proportions.

Through a process of slow but steady repeal, old laws are gradually being supplanted with laws that tolerate a modicum of marijuana as a slight offense, usually a misdemeanor that is subject to a small fine or overlooked. There is no evidence that in those states where the laws pertaining to *Cannabis* have been relaxed there is any increase in criminal behavior. All evidence is to the contrary. This country is finally learning that severe punitive measures have never deterred a populace from indulging in those things that they enjoy. As the old propaganda is fading, respectable institutions and researchers are investigating the real physiological effects of regularly using *Cannabis*. A really thorough report has yet to be issued. Some hazards, such as lowered testosterone levels, seem to be established. The entire picture has yet to come in.

The attempt to regulate large-scale sale and transit of *Cannabis* by dusting the plants by plane with herbicides such as Paraquat has led to the dangers associated with herbicide consumption, for the suppliers still harvest the poisoned plants and market them without warning. The United States government has to face the embarrassment of a scandal whose effects far overreach the use of marijuana. We will have to see what long-term effects might be wrought by herbicides that have in some instances shown to be carcinogenic.

The resins of *Cannabis* have been given to dogs in massive doses without a single fatality. Whether smoked or ingested, the usual effect is a euphoric, non-aggressive feeling often accompanied by an increased appetite. As it is usually smoked, the effect lasts for about two hours. When ingested, the euphoria may be prolonged up to twelve or more hours. This depends upon the quality of the resin or leafy material: that is to say, the amount of delta-1-tetrahydrocannabinol present, as it is the primary euphoriant. When d-1-THC was administered intravenously in experiments carried out under the auspices of the National Institute of Mental Health, it was found this component persists in the blood plasma for more than three days, after which it is completely metabolized. The metabolites leave the body in urine and feces after eight days. However, THC, as a non-polar compound, is lipophilic and accumulates in fatty tissues of the body. This may explain the phenomenon of "reverse tolerance" in which chronic users need progressively *less* of the drug to feel the effects. Naive smokers are often disappointed in the failure to feel any significant effects. This data stands in marked contrast to the ever-increasing need for larger doses of such drugs as heroin and nicotine.

The specific role of delta-1-THC is to affect the central nervous system by altering the turnover rates of such neurotransmitters as norepinephrine, serotonin, and acetylcholine. The negative effects are predominantly *potential* hazards at this point. The reduction in testosterone and deleterious effects on the bronchial system are established. The conjectural hazards that are under investigation are possible

chromosomal damage, interference with the immune system, interference with DNA synthesis, irreversible brain damage, marked personality changes. These are all under investigation as *suspected* rather than known effects. If we enumerate the hazards of alcohol and cigarette tobacco on human health, it is clear that both present a greater number of known health and social hazards than *Cannabis*. It should be noted that studies conducted in Jamaica of users who had been chronically involved with heavy *Cannabis* use for over nineteen years failed to produce evidence of the above suspected effects. Further, no organic or physiological addiction develops, and withdrawal symptoms are not evident. As with most drugs, psychic dependence and habituation may follow protracted use. The experience of true hallucinations is dependent upon the utilization of very intoxicating forms of hashish in substantial amounts.

Soma is known to most readers as the stimulant, euphoriant and hallucinogen in Aldous Huxley's novel *Brave New World*. Few people know that the plant soma actually exists and has been used as a narcotic since the time of India's earliest civilizations. In Ancient Indian mythology Soma, the brother of Indra, was the giver of health, courage, long life, a sense of immortality, and almost every other virtue known. As a narcotic, soma is thought to have originated in the Hindu Kush mountain range of northeast Afghanistan. There is evidence that Aryan invaders carried the plant to India and Persia, where it was readily adopted because of its psychoactive properties. Many of the hymns of the *Rig-Veda*, which were sung earlier than 800 B.C., refer to soma as a liquor and as a god. Recent accounts of the history of *Cannabis* have attempted to equate hashish with soma or homa. Homa is a plant derivative celebrated by Zarathustra, prophet to the ancient Iranians. There is every reason to believe that these are the same plants, but it is unlikely that either is *Cannabis* or a preparation of hashish. In *Rig-Veda* IX 113, soma is spoken of as a fragrant liquor, and in *Rig-Veda* X 85:3 there is a description of soma drinkers who "crush the juice from the plant." Neither of these suggests hashish or its mode of preparation. Phillipe de Felice, who wrote extensively on the uses of drugs in religion, adduced evidence that soma was a creeper or a vine, and *Cannabis* is bushy or upright.

Attempting to establish the identity of soma in over 144 hymns of the *Rig-Veda* has occupied ethnobotanists for some considerable time. These writings of the earliest settlers in the Indus basin are deliberately elusive on the point of the identity of soma. In this area and Iran there are several plants that are used under the name soma or homa, and yet these may not represent the soma of antiquity. The sporadic references to the plant in the *Rig-Veda* are elliptical and even contradictory. This plant that makes the gods dance and rejoice, produces mental exhilaration, increases the greatness of the priest in his sanctuary and of men, is strong drink for the omnipotent, is expressed by pounding it from the plant with stones, is mixed with milk, it speaks from the wooden bowl, it has swollen stalks which are milked like udders. These are a few of the most direct allusions to soma; others are far more oblique. We are also faced with the dilemma of distinguishing between references to Soma, the god, and soma as a plant or plant product. Although

most of these are concentrated in Mandala IX of the *Rig-Veda*, they may be found throughout the work. One major obstacle to uncovering the plant soma is the disagreement between Vedic scholars as to the precise interpretation of these texts. Max Muller, one of the greatest of Vedic scholars, stated in the preface to his 1891 translation of this work that translators of Vedic mandalas "ought to be decipherers, and that they are bound to justify every word of their translation in exactly the same manner in which the decipherers of hieroglyphic or cuneiform inscriptions justify every step they take." In the continuing Vedic scholarship this dictum has not always been followed, and literal interpretation has too often given way to poetic license and interpretation over translation. This is true of the translations of Wilson and Cowell, Griffith and Langlois.

The most recent assay to identify soma has been attempted by R. Gordon Wasson. Wasson relied on the translation of Geldner and that of Renou. It is the most thorough attempt yet to answer the age-old question of the botanical identity of soma, and it was done with the authoritative aid of W. D. O'Flaherty, an expert on Vedic culture and linguistics. Wasson perceived in these texts the absence of any mention of roots, leaves, branches, seeds, or fruits, and since the authors of the *Rig-Veda* do not mention these components, Wasson believes that they did not exist. Therefore, he asserts, the plant must have been a mushroom. Since the fly agaric, *Amanita muscaria*, is a montane plant and has a history of serving as an intoxicant among Siberians, it is put forth as the soma of the Hindu Kush or Himalaya foothills (Pl. 22). Wasson is aware of the limitations imposed by the infrequent presence of substantial numbers of these plants in the areas identified. This he believes may be answered by the assertion that Vedic priests had porters traveling to the forest belts of Eurasia to supply "the Divine Plant." This journey of thousands of miles to procure a plant considered divine hardly seems likely. It is difficult to find a single instance of an ancient culture that culled its sacred narcotic plants from a distant source. Some contenders for soma from previous investigators have been *Periploca aphylla*, *Ephedra* spp., *Rheum* sp., and *Sarcostemma brevistigma* (Pls. 23 & 24). Before dismissing these plants from the list of possibilities, we must investigate some of the assertions in light of their probability. As D. H. Ingalls, a Vedic scholar and supporter of Wasson's thesis, states, "Not all the epithets remarked on by Wasson need to be taken just as he takes them." Ingalls further notes, "I think Wasson's basic identification is a valuable discovery. But when a new tool is given to scholars, it is as important to prevent its misapplication as it is to recognize its value." He goes on to discount the Wasson thesis of "the third sieve," which states that the worshippers drank soma pissed out of the bodies of the priests. The interpretation is limited to a single verse in ten thousand verses of the *Rig-Veda* and is an extension of a practice among Siberians unknown to ancient Vedic people.

A few years ago a German pharmacologist, Hummel, wrote a treatise on soma in which he identified the plant as *Rheum palmatum*, or one of several other Asiatic species of rhubarb. The inherent problem is that *Rheum* species are non-narcotic. He suggested that any of four species of rhubarb were crushed and fermented with sugar or honey to give an intoxicating beverage. Max Muller instigated the idea of soma being a fermented beverage based upon the two kinds of intoxication

mentioned in the *Rig-Veda*: that of soma was without "evil effect" and that of beer was said to produce anger and folly. Each type of intoxication is based upon a different word. This has led to the supposition that soma could not be an alcoholic beverage. We need only look into the Christian tradition to find wine as a sacrament representing the blood of Christ, and wine as a mocker. Such a duality should not so easily disconcert translators. One of the attributes in these Sanskrit texts is that of intoxication and another is sweetness. Rhubarb leaves are emetic, and we might suggest that ritual emesis has been almost universally known as an act of cleansing and purification.

About the time of Hummel's thesis, a theory was advanced by the pharmacologist Quazilbash that soma was either *Ephedra pachyclada* or *E. intermedia*. Both are natives to the mountains of northwest India and have the advantage of being leafless, thus more in accord with the Vedic descriptions than *Rheum*, which has a very large leaf. Quazilbash maintains that in order to fit these Vedic hymns the plant had to be soaked in milk, crushed, filtered, mixed with honey, and the brew allowed to ferment. Such a mixture would then contain alcohol as well as ephedrine and pseudoephedrine and would serve as a psychoactive plant that would produce not only the stupor of alcohol, but the "exhilaration" that the *Rig-Veda* speaks of repeatedly. It seems clear that alcohol alone could serve only as a neural depressant and could not account for the states of ecstasy that soma provides. Even today these leafless, sun-loving plants are prepared in Khyber and parts of Afghanistan by boiling them in milk. The brew is thought to be an aphrodisiac and is most certainly a stimulant. Could this be a vestigial practice relating to an earlier soma ceremony? It is not an untenable hypothesis.

Those who have proposed *Sarcostemma viminalis* (*Asclepias viminalis*) as the holy herb fail to take into account that it is African and not Asian, and the juice is quite toxic, finding use as a fish poison. If we consider which plants found in Pakistan and the Hindu Kush and Pamir mountains of northwest India might be likely candidates, two come to mind: *Periploca aphylla*, a leafless decumbent herb or liana with milky latex, or the related *Periploca hydaspidis*. It was in 1885 that Julius Eggeling, noted for his Sanskrit translations, proposed *Sarcostemma acidum* as soma. Eggeling expressed doubts over his assertion, but indicated that every possibility seemed to favor *Sarcostemma brevistigma* (*S. acidum*). This leafless sprawling plant has many of the attributes found in the *Rig-Veda*. It is a series of branching stems that are quite leafless, and it grows in full sun (IX:86). When the seeds are released from the capsule, they emerge through a single suture that is like the opening of an eye (IX:10 and 97). These seeds, typical of the family, are released in a cloud of silvery comose down after leaving the leathery fruit coat, "he abandons his envelope . . . with what floats he makes continually his vesture of grand-occasion" (IX:71), and soma "shines together with the sun" (IX:2); "he has taken the back of heaven to clothe himself in a spread-cloth like to a cloud" (IX:69). We could give further examples in which the comose down is a cloud or silver or like sheep. The copious milky juice of *Sarcostemma* is reflected in these verses of the *Rig-Veda*: "When the swollen stalks were milked like cows with udders" (VIII:9), "Milking the dear sweetness from the divine udder . . ." (IX:107), "The udder of the

cow is swollen; the wise juice is imbued with its streams" (IX:93). These allusions are extremely frequent. As to the "navel of the earth" (IX:72), we have the perfect figuring of a navel in the round involuted center of the flower of *Sarcostemma*. It is this that gives way to the leathery fruit—"The hide is of bull, the dress is of sheep" (IX:70)—that conceals the seed with attached comose down. The form of this fruit is not unlike the horns of steers or bulls, "This bull, heaven's head . . ." (IX:27). Thus, we present but a few of the many verses in the *Rig-Veda* that could be applied to *Sarcostemma acidum*. Wasson has found them equally applicable to *Amanita muscaria*, the mushroom.

We know that *Sarcostemma brevistigma* is used in India today under the name soma, as are several other plants including *Ephedra* species. It may be that all of these are surrogates, or it is quite possible that *Sarcostemma brevistigma* is the plant soma of antiquity. A thorough chemical analysis of the latter to establish the presence of an intoxicating narcotic is in order. It is known that the dried stem is an emetic in Indian medicine, but what of the fresh milky latex? Certainly the herb is worthy of more investigation than has been conducted to date. In a volume entitled *Medicinal, Economic, and Useful Plants of India* by Sudhir Kumar Das, the foreword notes that the "therapeutic uses of plant materials have been quoted from records of the findings made through the ages by Hindoo Ayurvedic Pharmacists." In this compendium of ancient sources, *Sarcostemma brevistigma* is listed with the following note: "Herb. Plant juice is *intoxicating* and blood purifying." Such evidence is only circumstantial, but most intriguing. We must keep in mind that soma was a dangerous drug, that on occasion made Indra, brother of Soma, quite sick.

The contention by Wasson that soma is irrefutably and without a doubt the basidiomycete *Amanita muscaria* is disconcerting. No one has done a more thorough study than Wasson in an attempt to identify the plant soma, and his assertions must carry the weight that is commensurate with the scholarship that is to be found in *Soma, Divine Mushroom of Immortality*. The reader must bear in mind that interpretation is a thing apart from translation, and the ideal interpretation would come from a Vedic scholar who is also a botanist. Wasson's scholarship has opened new doors for us and is not to be taken lightly. It is a model for ethnobotanical research. Whether this resolves the age-old question of soma must be left to the reader.

What is the history behind the fly agaric, *Amanita muscaria*, that might engender a thesis such as that advanced by Wasson? We know that this mushroom contains the toxin muscarine in varying amounts, depending upon the area in which the fungus grows. It also contains the hallucinogens ibotenic acid and muscimole. This mushroom may be found in the temperate areas of the world following the belts of birches, beeches, alders, and pines. In its more southerly distribution it may be found about groves of eucalyptus and oaks. In the histories of the north European countries it appears as the mushroom in children's books having a red cap flecked with white. It is almost always portrayed in stories involving elves and dwarfs, the mystical little people of the forest found in the legends of most north temperate cultures. It was Lewis Carroll (Charles L. Dodgson) who popularized the idea that a

mushroom could make a person very large or very small in the eyes of those who partake of it. He had read a review of Cooke's manual on British fungi that contained an account of the properties of *Amanita muscaria*; these were translated into the experiences of Alice when she encountered a prophetic caterpillar in Wonderland.

We know of the antiquity of *Amanita muscaria* intoxication among the tribes of northeastern Asia, the Tungus, Yakuts, Chukches (Chukchees), Koryaks, and Kamchadales. It has also been used extensively among the Finno-Ugrian peoples, the Ostyak and Vogul. The earliest account of these practices was narrated to Europeans when in 1730 a Swedish army officer published his account of imprisonment in Siberia. In 1762 Oliver Goldsmith described his experiences of the use and ritual surrounding this colorful fungus. Since the mushroom is not abundant in northeast Asia, a curious practice has developed. Women of a tribe chew the dried fungus into a pulp, which is rolled into sausage-shaped pieces of a few inches in length. These are eaten by the men of the tribe. Two fungi are usually enough to produce a state of gaiety and exuberance. After passing through the kidneys, the mushroom is detoxified of muscarine and yet the potent muscimole, produced by the decomposition of ibotenic acid, is still abundant in the urine. As testimony to this, we have the words of Goldsmith:

The poorer [Tartars] post themselves around the huts of the rich and watch [for] the opportunity of the ladies and gentlemen as they come down to pass their liquor, and holding a wooden bowl catch the delicious fluid. Of this they drink with the utmost satisfaction and thus they get as drunk and as jovial as their betters.

Keenan, who was among the Chukches in 1870, reported that a single mushroom was sufficient to keep a band intoxicated for a week, and a single mushroom would fetch three or four reindeer. This is interesting in light of experiments with *Amanita muscaria* in Cambria Pines, California. My informant relayed to me an experience in which he consumed eight of these fungi. Only after such a large dose did he feel any effects, and these were loss of motor coordination, paranoia, and uncontrolled speech. Obviously this fungus shows great variability throughout its range. The other possibility is that an in vivo processing of ibotenic acid to muscimole may be more efficient in bodies of differing physiology. If ibotenic acid decarboxylates and loses water, it becomes five times as potent, for it is then changed to muscimole. Muscazone is found in lesser amount and is pharmacologically less active.

Could this Siberian tradition be allied to the cult of soma? Could this area have been one of the sources for *Amanita muscaria* via an incredibly long trade route? Is this the source for the practice of the priest pissing soma as indicated in the *Rig-Veda* interpreted by Wasson? We know that the Siberian uses involved eating the mushroom after it had been dried in the sun or over a fire, extracting the juices in water and sometimes drinking them with an admixture of reindeer milk. These practices do correspond to many of those indicated in verses of the *Rig-Veda*. The practice of mixing the mushroom with the juice of *Vaccinium uliginosum* or

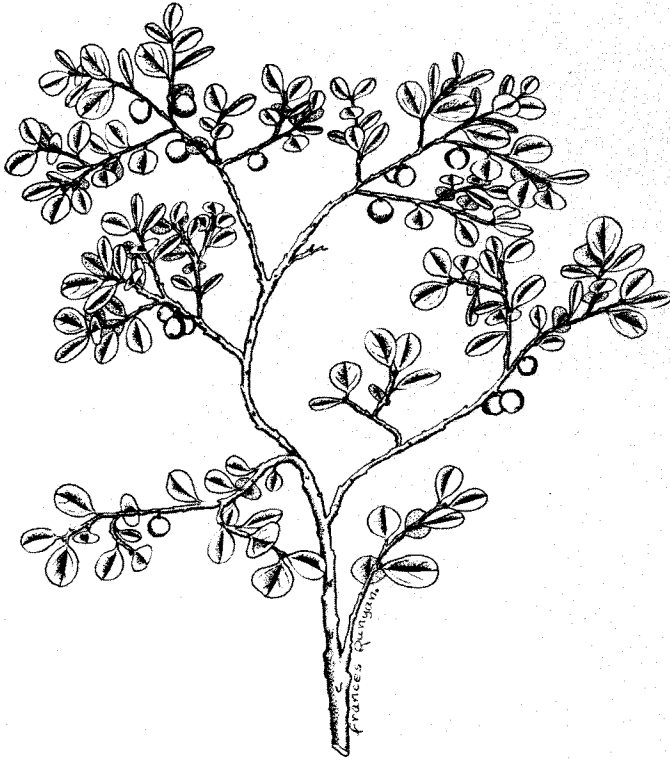


FIG. 31:
Vaccinium uliginosum

Epilobium angustifolium is most interesting (Figs. 31 & 32). In Millspaugh's *American Medicinal Plants*, he mentions several species of *Epilobium* as being used for cramps, diarrhoea, and dysentery. The preparation involves chopping and pounding the entire plant. In addition to the expected effects, he noted that the tincture "caused some symptoms that must have been due to so large a drink . . . symptoms that we are prone to lay to the alcohol." Citing the works of Dr. Wright, who took one-half ounce of the tincture and became intoxicated, we have reason to believe that perhaps there is an intoxicating principle in *Epilobium*, for one-half ounce of a tincture of the plant plus alcohol is a small amount of alcohol in terms of giddiness or intoxication. This same author says of *Vaccinium uliginosum* that it is intoxicating and narcotic. Could it be that some of the effects ascribed to the berserker of Scandinavia, who went into impassioned frenetic states of orgies and murder, used not only *Amanita muscaria*, but also these narcotic admixtures? *Vaccinium vitis* was used by the Shakers as a substitute for the related *Arctostaphylos uva-ursi*, whose leaves were smoked as *sagack-homi* in Canada and as *kinikinik* among western hunters. These admixtures to the mushroom are much ignored.



John Allegro, who has distinguished himself as a translator of ancient languages, extended the *Amanita* argument in a book entitled *The Sacred Mushroom and the Cross*. Using linguistic arguments that begin with Sumerian tablets from Arcad and Erech, he traces the mushroom through several cultures and finds it to be a focal point in the Christian tradition. The strong sexual interpretations of these practices all but occlude the argument. One strong point in favor of Allegro's argument is a fresco dating from 1291 on a wall of a deserted church in Plaincourault (Indre, France) which shows Adam and Eve posed on either side of the "Tree of Life" depicted as a large branched *Amanita muscaria* with a serpent wrapped about it. The forbidden fruit in the mouth of the serpent, Satan, is either an apple or a piece of the red *Amanita* cap (Pl. 25). Did the celebration of *Amanita* as a sacred plant exceed that of all psychotropics from many different cultures? Did this tradition originate in the cult of soma among the Vedic peoples? Was soma really *Amanita*, or *Ephedra*, or *Sarcostemma*? One thing remains a certainty: the story of soma has not yet reached its terminus, and the ancient scribe who once penned the following characters in Sanskrit had a yet unraveled secret:

*Heaven above does not equal one half of me.
Have I been drinking soma?
In my glory I have passed beyond earth and sky.
Have I been drinking soma?
I will pick up the earth and place it here or there.
Have I been drinking soma?*

Rig-Veda X:119, 7-9

Datura is a genus of almost pan-temperate and pan-tropical distribution, and the origin of this highly variable genus is disputed by botanists. The narcotic qualities of *Datura* led to its use as a medicine and mind-altering agent at a very early date in both the Old and the New worlds. Avicenna, the Arabian physician of the eleventh century, noted the intoxication produced by a small amount of the *Datura* "nut" (seed) and wrote of its value in medicine. The generic epithet was derived from early Arabic names for *Datura*: *datora* and *tatorah*. Both of these may be traced to the term *dutra* in India or some of the early Sanskrit writings, in which it is mentioned as *dhustura* and *unmata*. These were probably all names for a single species, *Datura metel* (Fig. 33). The specific epithet of *metel* may derive from the Arabic drug of which Avicenna wrote, *jouz-mathel*. While it is thought that the greatest area of ritual use is now in the area from north Mexico through South America, I believe that this may be due to our lack of knowledge of some of the earliest practices in the Old World, where the plant dates to prehistory. Perhaps no more diverse kinds of practices exist with respect to hallucinogenic plants than we find in *Datura* intoxication. This may seem astonishing considering the extremely toxic nature of the entire plant. It is equally curious that the customs surrounding

FIG. 32: *Epilobium angustifolium*

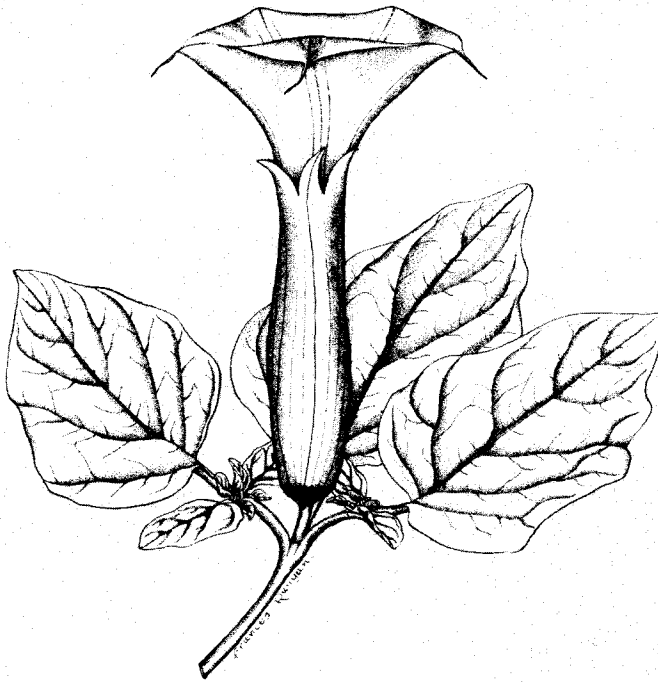


FIG. 33:
Datura metel

the use of *Datura* in temperate Asia at a very early date parallel those of contemporary native peoples of the New World.

Because a concoction of ground seed with water has the power to stupefy, it became a popular drug among thieves and criminals who would use this drug, often with hashish added, to intoxicate their victims. This was a common practice in India, where the same plant was used to treat over twenty diseases including pneumonia, heart disease, mumps, sexual perversions, toothworm, hysteria, epilepsy, and other real or imagined conditions. The liquid extracts of *Datura metel* were useful in drugging young girls and exploiting them as prostitutes; subsequently they would employ extracts of the herb as "knockout drops" to take advantage of their clients. It is no wonder that in India the plant came to have an evil reputation, and those who used it were the *dhaturess*. Only in China was it without the reputation of an evil plant, for there it was sacred and received droplets of water when Buddha spoke. It originated when Buddha promulgated the law. It was then that the plants descended from heaven. Both the flowers and seed of *Datura alba* were used in China under the name *man-t'o-lo* for pustules, swollen feet, prolapsus ani, colds, cholera, and a host of nervous disorders. Equal quantities of this plant and *Cannabis*, dried, pulverized, and steeped in wine, were used to perform operations

and cauterizations without pain. It was noted that when used as a medicant *D. alba* often produced a giddy state of laughing and dancing. We do not have a fine record of magico-religious use as we do in the Americas.

SOUTH PACIFIC

Kaempferia galanga is an attractive herbaceous perennial found in loamy soils and shaded areas of New Guinea, India, Malaya, the Moluccas, and the Philippines (Pl. 26). From a pair of glossy deep green leaves there emerges a spike bearing a few pale white flowers mottled violet and having a creamy yellow throat. Under the name *gisól*, the rhizome is used as a ginger-like condiment, and the juices are expressed for sore throats, to accelerate scar tissue formation, and on boils and similar skin eruptions. A related species of tropical Asia, *K. angustifolia*, figures importantly in cough medicines. Because of the fragrance of the rhizome, it is also important in perfumes. In Cambodia, *K. pandurata* is used in colic and stomach ailments, and in Java and surrounding territories the species *K. rotunda* can be found in materia medica as being official for gastric complaints. It is said that *gisól* is useful in severe headache and relieves pain at childbirth. Apart from these fascinating medical applications for this plant, it has been regarded by some groups in New Guinea as a hallucinogen. As *maraba*, the oily juice of the rhizome is consumed. Thus far it has not been possible to identify a psychoactive principle from *K. galanga* or any related species, and we might suspect it to be a semi-sacred plant around which an elaborate psychodrama mimicking hallucinations is witnessed; however, there are a number of plants that have been demonstrated to be psychoactive for which we have no phytochemical information that would support these as hallucinogens. This is the only member of the ginger family that has been reported as a hallucinogen.

Agara is the name by which the Papuans know the timber tree *Galbulmima* (*Himantandra*) *belgraveana* (Fig. 34). This is one of the several species found growing in eastern Australia and eastern Malaysia. A decoction of both the leaves and bark is made and added to leaves from *Homalomena ereriba*, an herbaceous aroid (Fig. 35). The resulting mixture, when drunk, or the bark and leaves chewed together, produces fits of violent intoxication accompanied by spectacular visions and dream-like states that terminate in a deep somnolence. Reports from the Papua, New Guinea, Scientific Society indicate that several isoquinoline alkaloids have been isolated from *Galbulmima belgraveana*, among these himbosine, himbacine, himgaline and others. The structure of most of these alkaloids has now been identified, but none seems to show any hallucinogenic activity. Only himbacine's anti-spasmodic action would seem to make it more suspect than the others. While no hallucinogenic compounds have been isolated from *Homalomena ereriba*, *H. rubescens* of Malaysia is used as a fish poison under the name *ipoh*. Chemical studies of the *Homalomena* species are few, and yet over one hundred forty species are known from tropical Asia and South America.

The islands of Hawaii are famous for the attractive plant materials shipped to the mainland of the United States and to the rest of the world to be used in dried

flower arrangements or as seeds in jewelry. Prominent among these is the "Hawaiian baby wood rose," which is not a member of the rose family, but is a tropical woody liana of the morning glory family (Convolvulaceae). The black seeds within the capsule, which forms after the appearance of the flower, have been used among the poorer Hawaiians for a "high." Unfortunately, the complex alkaloids of these seeds of *Argyreia nervosa* provide not only hallucinations, but a hangover characterized by blurred vision, vertigo, and physical inertia (Fig. 36). In the genus *Argyreia* there are thirteen species containing amides of lysergic acid (*speciosa*, *nervosa*, *acuta*, *barnesii*, *wallichii*, *capitata*, *splendens*, *osyrensis*, *aggregata*, *hainanensis*, *obtusifolia*, and *pseudorubicunda*). It was not until 1963 that the presence of amides of lysergic acid were ascertained to be present in *Argyreia* species. Since then there have been several embargos, and a great deal of controversy over the propriety of shipping these fruit capsules and seeds throughout the world. The presence of D-lysergic acid (ergine), isoergine, chanoclavine, elymoclavine, and ergonovine are responsible for the effects experienced, but it is the D-lysergic acid that is responsible for the potent hallucinatory experience. Species of *Ipomoea*, *Rivea*, *Claviceps*, and *Stictocardia* are all chemically related to *Argyreia* and will be discussed in the context of their geographical origins and places where they are used. Suffice it to say that all of these are the natural sources for chemicals that are closest to the most potent psychotomimetic known, LSD-25, and most have an antiquity of use extending over hundreds of years.

One of the most fascinating recent ethnobotanical studies covering the area of New Guinea was presented by Harold Nelson at the sixty-ninth Annual Meeting of

FIG. 34: *Galbulmima belgraveana*

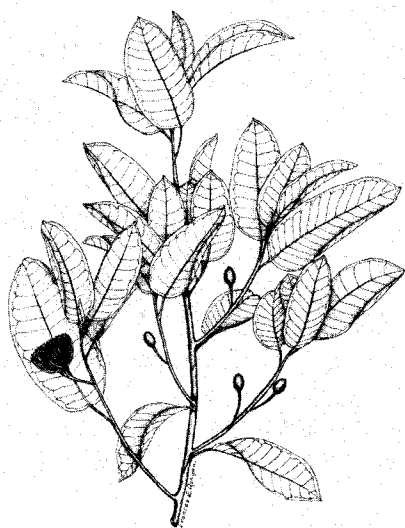


FIG. 35: *Homalomena* cf. *ereriba*



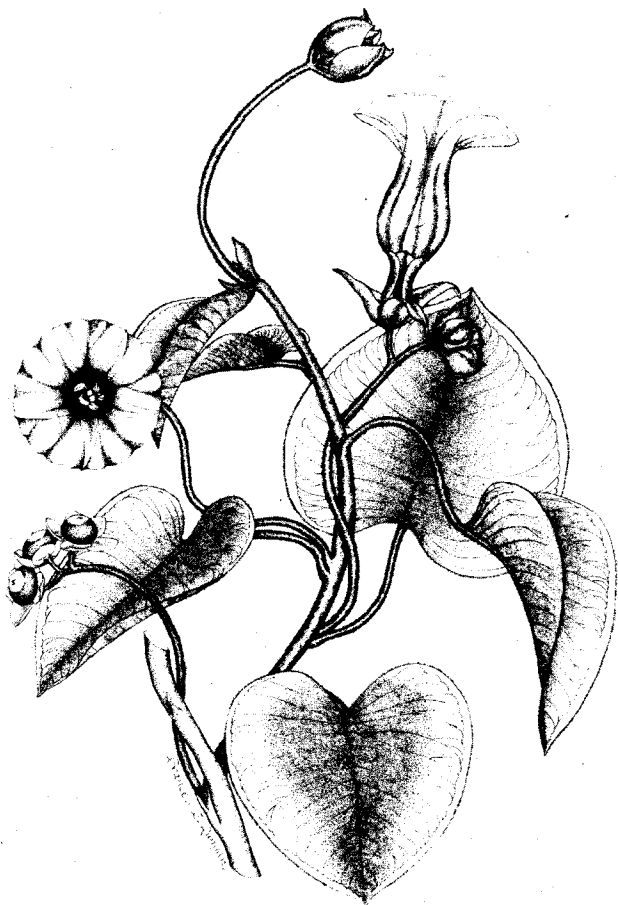


FIG. 36:
Argyreia nervosa

the American Anthropological Association in November 1970. "Mushroom madness" had been laconically noted by Fr. William Ross in 1936, and an inquiry into this phenomenon was initiated by Marie Reay, who worked in the Wahgi Valley in the Western Highlands of New Guinea. Nelson lived with the Kaimbi people in the Bebilyer Valley along the southern slopes of the Kubors during 1967-68 and documented some of the lore associated with this curious seasonal madness. These people know the mushrooms of the area as *nonda*, and the effects of tremors, multiple vision, asphasia, jumping, and feigning attacks upon creatures seen by the "mad one" are similar to reports by Reay. Sexual delusions and patterned lewdness reported by Reay were not observed by Nelson among the Kaimbi. Roger Heim, the famous French mycologist, identified all of the *nonda* encountered by Reay after the team of Reay, Heim, and Wasson revisited the Wahgi for three weeks in 1963. This team found some additional *nonda*, previously unidentified at this time. In their

1965 report the team presented *Boletus nigroviolaceus*, *B. nigerimus*, *B. kumaeus*, *B. reayi*, *B. manicus*, *Heimiella anguiformis*, and an unidentified *Russula* (Pl. 27). All have been implicated in the manic states called *ndaadl*, which is experienced by females, and *komugl-tai*, which is the male form of the mania. Children have occasionally been known to suffer "mushroom madness" as well. Nelson asserted that the behavior, as distinct from true madness, is temporary and has socially defined limits. Heim and Wasson concurred in believing that "mushroom madness" permitted cultural psychodramas to be enacted harmlessly with the mushroom being the scapegoat. For Reay, the madness was "institutionalized deviance," or a sort of ritualistic rebellion.

Among those who have worked on the New Guinea mushroom madness, there is controversy as to whether the mushrooms actually lead to physiologically based madness, or whether it is a combination of social and psychological factors. Nelson has adduced a substantial body of information supporting the contention that it is a chemically based intoxication. Further, he notes that the Kiambi are unanimous in their judgement that at least two of these mushrooms lead to a madness that is a "bad trip," and the madness in one instance may last for as long as two months. It is sometimes necessary to overtake the affected person and physically restrain him by binding him or her with ropes and roasting the madness out very near to a fire. The delusions are sometimes expurged by dunking the victim in cold water.

The preponderance of evidence seemed to weigh against Nelson for a time, but in 1967 Roger Heim published some additional notes on new investigations of hallucinogenic fungi in the memoirs of the National Museum of Natural History in Paris. These have not been translated into English, so a synopsis of some of the information on New Guinea is in order here. Heim continues to support the contention that the temporal derangement is theatrical simulation, but notes that on a sojourn to the village of the Kondambi in Kuma country he discovered two meadow species of psychotropic *Psilocybe*. In this instance Heim mentions only *P. kumaenorum* growing in grassy meadows "somewhat hidden." This brown-black fungus that turns purple-black to gray-green at maturity is unique in being the first encounter with *Psilocybe* outside of Meso-America (except for *P. semilanceata* of Europe, which is indistinguishable from *P. wassonii*, native to the Tenango del Valle region of Mexico). Heim believes that this fungus in New Guinea is not used for intoxication due to an ignorance upon the part of the natives as to its properties.

Keeping in mind that the Wasson-Heim team spent only a few weeks in the area, we may propose that the practices of the people were not made fully known to them. Earlier, Wasson and Heim reported that the Wahgi had no agreement among them as to which mushrooms induced the madness. All of this assumes that the anthropologist and ethnobotanist going into a remote area will be given full information of an accurate nature by their informants concerning plants that they believe to be of a magical nature. I believe that such a presumption is untenable. We have had similar experiences in Mexico where searching for magic plants failed to turn up such species as *Salvia divinorum* for centuries after such inquiries were initiated. In the last several decades a number of astonishing reports have emerged. New Guinea is filled with fungi of numerous genera, many of which have yet to be

identified or even collected by non-natives. Almost no information exists as to the chemical constitution of these mushrooms. It is necessary that biochemical assays be made in order to ascertain the composition of the fungi and more thorough observations over longer periods of the mushrooms employed. It seems unlikely that given the broad use of mushrooms, the presence of *Psilocybe* with its potent intoxicating psilocin and psilocybin would be ignored by native inhabitants only to be discovered by a non-native visiting the area. One is obliged to concur with the thesis of Nelson that at least a part of this often protracted madness is genuine mushroom hallucination. Even in the use of other known hallucinogens, we see a strong influence of culturally conditioned behavior that is also cultural psychodrama.

AFRICA

Members of the cult of Bwiti (Bouiti) in Gabon revere a forest shrub, *Tabernanthe iboga*, which they associate with the dwelling place of their ancestors. In the Bwiti mythology the Creator God dismembered a pigmy and buried his parts in the forest. His wife discovered that plants had risen from her husband's flesh. She was instructed by the Creator God to eat of their roots so that she might once more communicate with the spirit of her dead husband and moreover have a knowledge of the supernatural. From that time hence the Bwiti have venerated *Tabernanthe iboga* and partake of its flesh by digging the root and chewing on the root cortex (Fig. 37). Three hundred to eight hundred grams of crude root bark may be consumed by one individual in the course of a day, resulting in an altered state of consciousness often characterized by verbalization of the visions seen. This state prompts divination of illness, permits a knowledge of the "true religion," allows the fetish to enter. The initiate may be given massive doses to open his mind to the Bwiti way. It is also believed that the root is an aphrodisiac and thus cures impotency. The cults of *iboga* (*eboka*) use are to be found among the Oubanghi tribes of Cehari as well as the natives of Lambarene in Gabon, formerly a part of the French Congo. Vomiting and loss of motor coordination characterize the intoxication, and the attendant visions are of strong colors. Dramatic presentations of the visions include stories of seeing a great tumult, speaking to specific ancestors and relating their conversations, walking or flying the lengths of a great road, and a vision into the cave of life.

Initiates into the Bwiti cult are given forty to sixty times the normal amount of root bark ingested by cult members. This introduction results in vomiting, loss of motor coordination, and sometimes death. Deaths are taken to be a divine will intervening; the initiate was not prepared. Sick members of the cult may also be given these excessive doses in order to help them divine the source of their illness and know of its outcome. Although the French and Belgians made brief notes on a few of the uses of *iboga* as early as 1864, it was not until H. G. Pope in 1969 and J. W. Fernandez in 1972 published their accounts of this plant as a ritual hallucinogen that its significance was fully comprehended. The ritual elements of death, rebirth, the rites of oomphagos and sparagmos, the way of linking past and present through this plant bespeak strong transcultural ties with divergent areas and cults: the

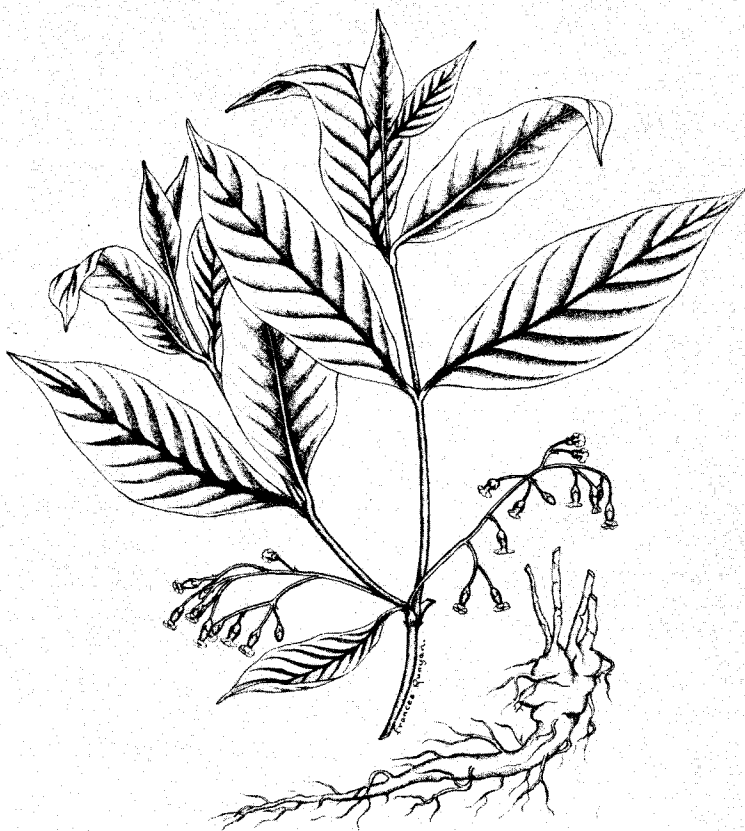


FIG. 37:
Tabernanthe iboga

Dionysian rituals, kava kava legend, peyote stories and rites, Mexican mushroom ritual, Amazonian *yagé* ceremony, and the Christian tradition. There is no compelling reason to believe that these syncretic elements were learned, but it seems that several have independent origins. The postulates of Jungian archetypes, cultural conditioning, chemical constants may all play a role, but the phenomenon is still essentially unexplained.

When the French occupied the territory of Gabon, they were impressed with the attributes of *Tabernanthe iboga* and sent the root cortex back to France, from which their chemists made a crude extract that they sold as Lambarene. Lambarene was used in western Europe at the beginning of the century to cure everything from neurasthenia to syphilis. Needless to say, its greatest popularity derived from its reputation as an aphrodisiac. It is only recently that ibogaine has been isolated as the active ingredient in the root. Six per cent of the dried root cortex contains twelve closely related indoles that may function together to produce the *iboga* intoxica-

tion. The ibogaine fraction is known to function as a cholinesterase inhibitor and stimulant as well as functioning as a hallucinogen. Admixtures to the root include as many as ten different plants: *Cannabis*, *Nicotiana*, *Alchornea*, and *Elaeophorbium* are but a few genera often added.

Elaeophorbium drupifera, which is common on coastal plains and in forest areas, has a host of names including *kankan*, *dolo*, *tulo*, *toro*, and others (Fig. 38). It grows into a tree up to fifty feet high bearing small greenish flowers that are displaced by a yellow-orange fleshy fruit. This fruit is often eaten by browsing antelopes, but crushed with the leaves, it serves as a fish poison. The latex of this tree is quite caustic and if rubbed into the eyes, results in permanent blindness. For centuries it has been used in Africa to cure scorpion stings, warts, ringworm, and is added to eggs as a purgative. It is the latex that is added to *iboga* root bark and may be a

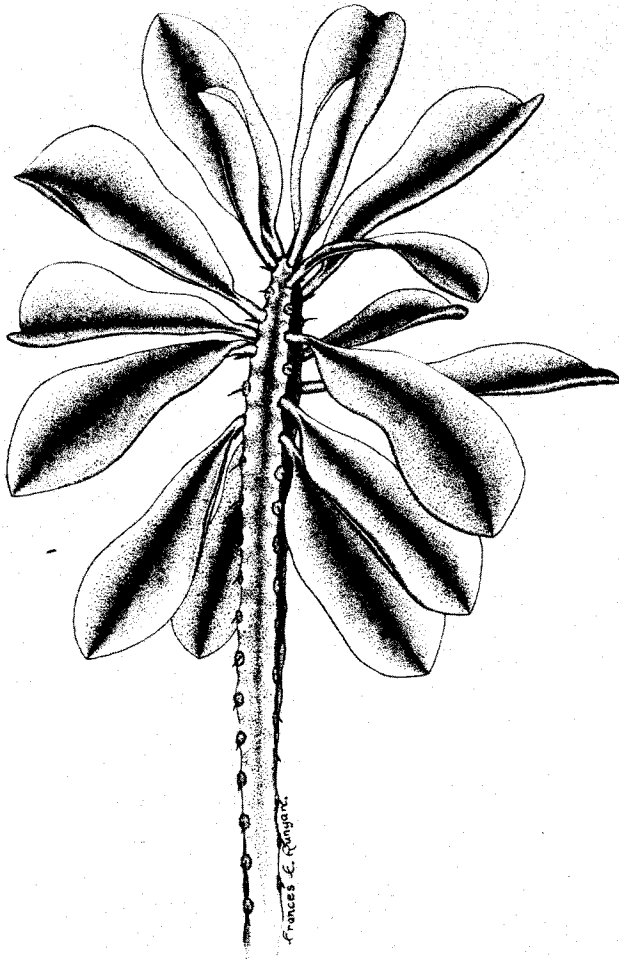


FIG. 38:
Elaeophorbium drupifera



FIG. 39:
Alchornea floribunda

hallucinogenic additive known by the natives as *ayan* and *beyem*. It is said to enhance the effects of another intoxicant in the area, *Alchornea floribunda* (Fig. 39). A direct use for *kankan* is to dip a feather into a combination of the latex and an oil and brush it across the eyeballs to produce extraordinary visions. This was a common practice among the Fang people, who are the predominant users of *iboga*.

Another important adjunct to *iboga* is the plant *Alchornea floribunda*, which is called *alan* by the Bwiti and generally known as *niando* in Liberia, Nigeria, and Uganda. It is a member of the spurge family (Euphorbiaceae) to which *Elaeophorbia* also belongs. Cults living south of the Fang (Bwiti) in Gabon mix *alan* with *iboga* even though it is generally regarded as having less power than *iboga* when used alone. Unspectacular in appearance, the small tree has a root bark that is macerated to form an alleged aphrodisiac and a strong intoxicant. Powdered *niando* is sometimes mixed with salt or food and eaten before tribal activity or warfare. Steeped in palm wine or banana wine, it produces an intense excitement that eventually culminates in a deep depression known to have been fatal on several occasions.

In 1958 a report from France indicated the presence of yohimbine as well as several unidentifiable alkaloid fractions in a sample of *niando*. Yohimbine has been

identified as an aphrodisiac and has hypotensive effects, while the unidentified fractions may account for the narcotic effects of the root bark. Later investigations failed to show the presence of yohimbine in the original sample, which may have been due to deterioration. *Niando* is a powerful plant capable of bringing great joy and profound sorrow. Its hallucinogenic status has been questioned; however, continued use among secret societies of the Byeri in Gabon suggest that it must have some unusual properties.

The genus *Mesembryanthemum* is a popular groundcover in the southwestern United States, but a section of the genus designated as *Sceletium* serves as a narcotic in South Africa. Kolbe reported on the use of *Sceletium* under the name of *kanna* (*channa*) over two hundred and fifty years ago. Two species, *S. expansum* and *S. tortuosum*, have long been in use by the Hottentots of Karroo (Figs. 40 & 41). Kolbe stated that they chewed the roots, keeping the plant in their mouths for some time and passing from an initial state of excitement in which "their animal spirits were awakened, their eyes sparkled and their faces manifested laughter and gaiety. Thousands of delightful ideas appeared, and a pleasant jollity which enabled them to be amused by the simplest jests. By taking the substance to excess they lost consciousness and fell into a delirium." Lewin, reporting on Kolbe's observations, found it impossible to believe that these plants could produce such an effect and felt that perhaps Kolbe was confusing them with *Cannabis* or *Sclerocarya caffra*. Lewin added his further notes that both species of *Sceletium* were used on the Cape of Good Hope in the hinterlands under the name *kaugoe* (*gawwgoed*), and on the

FIG. 40: *Sceletium expansum*,
eighteenth-century woodcut



FIG. 41: *Sceletium tortuosum*,
eighteenth-century woodcut



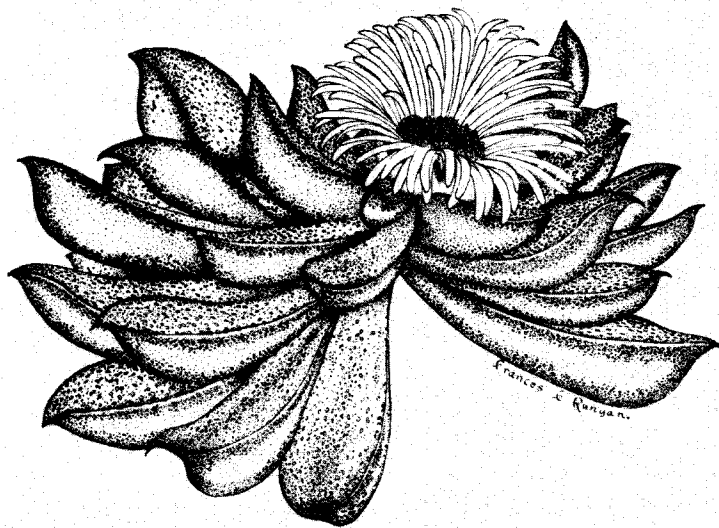


FIG. 42:
Nananthus albinotus

Karoo plateau and in Namaqualand the roots, leaves, and trunk of these are both chewed and smoked. He pointed to an unidentified alkaloid that would produce a torpor in man in the dosage of five grains. Subsequently, mesembrine and mesembrenine were isolated from these plants. The former produces a sedative-like effect. The toxic side effects from using the plants are headache, listlessness, loss of appetite, and depression. One of the reasons that we lack contemporary reports as extravagant as that of Kolbe is that the dosage was probably much greater in earlier times. Consider *Nicotiana* and *Tabernanthe*; neither of these produce significant effects in moderate doses, but massive doses have profound narcotic effects. Perhaps, on the other hand, there is some confusion between *Sceletium* and a related genus, *Nananthus*. *S'keng-keng* is the name by which a number of South African tribesmen, especially the old Griquas, know *Nananthus albinotus*, which they pulverize in its entirety as a hallucinogenic additive to their smoking tobacco or snuff (Fig. 42). A chemical analysis of *Nananthus albinotus* has yet to be accomplished.

The word *dagga* is familiar to many as the South African term for *Cannabis*, which enjoys a considerable popularity throughout Africa. Recently it has been ascertained that *dagga* applies equally well to several species of *Leonotis leonurus* (Pl. 28). This plant has come to many subtropical areas as an ornamental shrub under the name "lion's tail." From the leaves of this member of the mint family (Labiatae), a dark green resinous exudate is obtained and smoked with tobacco. An alternative mode of use involves pinching out the young shoots that are about to

flower and smoking them as a tobacco substitute under the name *dagga-dagga*. The Hottentots are quite fond of it as a narcotic, producing a mild state of euphoria much like some *Cannabis*. It is also used for diseases such as leprosy, cardiac asthma, epilepsy, and snakebite. Farmers and kaffirs appreciate the states of evanescence that *Leonotis* can provide.

Tropical East Africa has a wealth of plants whose medicinal values are known only to the people living in that area. Occasionally a medical journal will publish a note on these, but few have found their way into medical practice in Britain or the United States. In the Piet Retief region of Eastern Transvaal there grows *Monodenium lugardae*, a member of the spurge family that is little more than a pale-green club-shaped shoot terminating in a corona of simple leaves (Fig. 43). Yet this plant is of the greatest importance to the *sangomas*, the ritual diviners of that area.

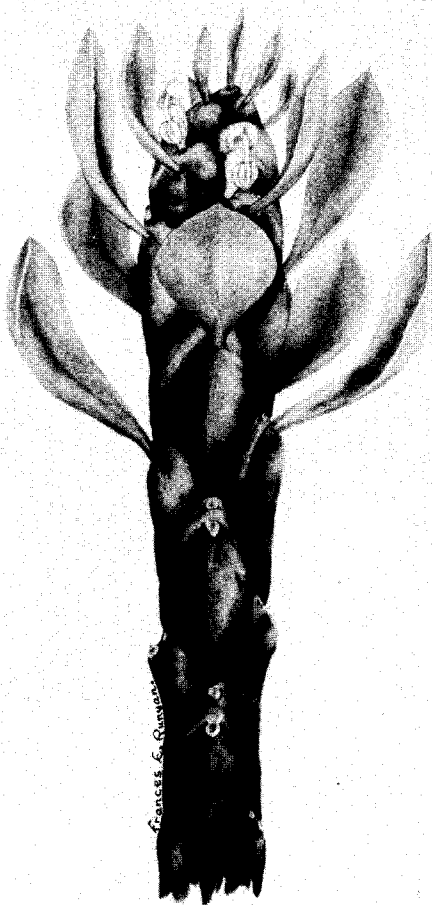


FIG. 43:
Monodenium lugardae



FIG. 44:
Pancratium trianthum

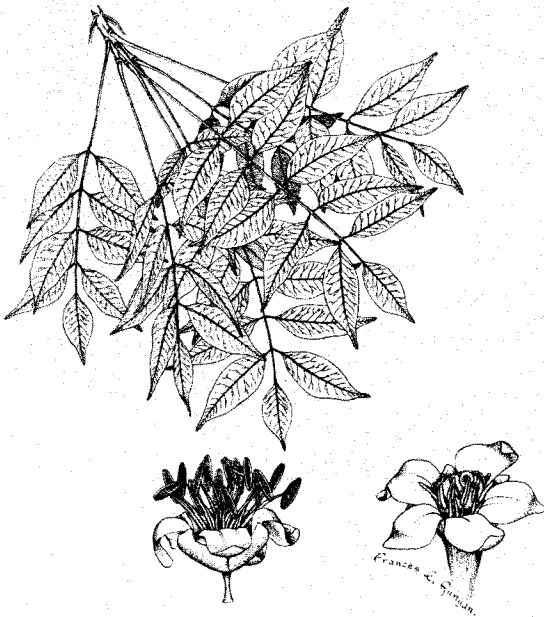


FIG. 45:
Sclerocarya caffra

These oracular figures will chew a piece of the root and swallow it to produce visions of a prophetic nature that will divine the illness and make the cure apparent. No chemical assay exists to determine the cause of the peculiar narcosis.

In horticultural practices the genus *Amaryllis* enjoys considerable popularity. Closely related to this genus, and in the same family, is *Pancratium trianthum*, often found growing around shrines and sacred areas (Fig. 44). It bears lily-like flowers of pink and white stripes on a naked scape. The bushmen of Dobe, Botswana, know this bulbous perennial as *kwashi*, a powerful sacred hallucinogen capable of producing vivid and colorful visions. The bulb is not eaten, but rather is slashed open and pressed onto self-inflicted wounds on the foreheads of participants. The intoxicating principle is transported directly into the circulatory system, creating an immediate reaction. A related species, *Pancratium speciosum*, is used by the Caribs of the West Indies under the name *ognon* or *gli* as a powerful emetic. Some species are quite narcotic and are reported to have caused death by paralysis of the central nervous system; still others are classified as cardiac poisons. *Kwashi* is perhaps one of the most unusual hallucinogens in terms of the mode of use, and one of the most dangerous. This is not a deterrent to ritual use.

The people of Zulu, Swazi, Tsonga, Sotho, and Venda refer to an attractive tree with shiny dark-green leaves as *marula* and *umganu*. This plant, *Sclerocarya caffra*, and its relative *Sclerocarya schweinfurthii*, are both used to form intoxicating beverages (Fig. 45). Lewin believes that either of these two species better qualifies for the title of *kanna* of the early Hottentots than other suggested species. *Sclerocarya caffra* rarely exceeds thirty feet in height and forms a crown in the shape of a hemisphere. It is a dioecious tree and bears red racemes of flowers on the male trees and small solitary flowers on the female. The latter form an abundance of yellow plum-like fruits at maturity and have the odor of turpentine when fully ripe. These fruits have been used to brew an exceptionally intoxicating beer. A man who has drunk of it is not allowed to bear arms. This too may be a form of social drama within a framework of anticipated behavior, for no evidence thus far has come from the oily fruit to establish it as hallucinogenic.

The distilled oils of common fennel, *Foeniculum vulgare*, were used as a medicine in Morocco at an early date to treat a variety of illnesses (Pl. 29). It was observed that therapeutic doses of the oil would sometimes induce an epileptiform fit of madness and hallucinations. This divine state of madness might be considered a revelation that would divine the nature of the illness. Its use in European witchcraft to ward off evil spirits would suggest powers beyond the ordinary have been associated with this fragrant perennial. Pliny believed that when serpents ate of it they would cast off their skins. It was said by the herbalists that this plant could restore lost vision. Fennel, dill, anise, and parsley all have similar oils, but it has been demonstrated that in vivo amination of these ring-substituted compounds can result in a series of three narcotic amphetamines. When these herbs are used as condiments, appreciable amounts of these oils are not taken into the system; oil distillates, however, could act as precursors to amphetamine formation. We know the ancient European practice of using dill tea (from *dillan*, to lull) to put infants to sleep has merit. This may be explained by the above chemical conversion.

Amphetamines have the opposite effect upon children and would cause a sedated state. These oils are undoubtedly more complex than our present analyses suggest. Longfellow said of the fennel plant:

*Above the lower plants it towers,
The fennel with its yellow flowers;
And in an earlier age than ours
Was gifted with the wondrous powers
Lost vision to restore.*

The host of plants that bear oils and are of the family Apiaceae are potentially psychoactive and merit further investigation.

NORTH AMERICA

In most instances plants with psychoactive properties have been used to achieve altered states of consciousness in the area to which they are indigenous; an extraordinary plant, such as *Cannabis* or *Papaver*, soon finds its way to other areas by way of early trade routes. It is far rarer for a plant to be introduced for ornamental or medical reasons and then enter into use as a psychotomimetic. This is the case with the Madagascar periwinkle *Catharanthus roseus* (formerly *Vinca rosea*) (Pl. 30). This small white, pink, or violet flowered herb is not only ornamental, but promised to become an important medicant in diabetes when it was found to contain a host of alkaloids rarely found in other plants. Soon this plant was elevated to greater prominence when it was found to contain not only reserpine, but vinblastine and vincristine. The latter two are capable of inhibiting the division of cells associated with several forms of cancer. It was noted by physicians that in this therapy one of the side effects was a state of euphoria with some hallucinations of a pleasant nature. When this information became generally known, there was an outbreak of *Catharanthus* smoking in Miami, Florida, where the plant grows as a weed. One of the alkaloids is of an ibogaine indole structure, which accounts for the hallucinogenic effects. A related species, *C. lanceus*, has been shown to contain more than five per cent yohimbine, enhancing the psychotomimetic qualities.

Unfortunately, the "high" obtained from smoking *Catharanthus* has severely debilitating side effects. Ataxia, loss of hair, skin sensations, burning sensations, and muscle deterioration follow extended use of this plant material. One of the immediate manifestations is a reduction in the white blood cell count, which makes an individual susceptible to a host of diseases. Long-term damage is yet incalculable. In the hands of psychopharmacologists, who isolate these alkaloids and use them therapeutically, they may be among the most promising of the new medicines from plant sources. Crude plant material of *Catharanthus* used by individuals for experimental euphoria can be extremely dangerous.

Datura, mentioned earlier in connection with Asiatic cultures, has had a prominent role in native medicine and coming-of-age rituals in the southwestern United States. Under the name *toloache*, derived from Aztec sources, the plant was used for almost every disease by native North Americans and for setting broken bones as

well as an anesthetic in operations. Like *Cannabis* among the Scythians, it was used in rituals following the death of a tribal member. Some tribes used the plant for snakebites and tarantula bites. Among the Hopis, the root of *Datura inoxia* (*meteloides*) was used for divining while the Yokuts and the Luiseños used large doses to initiate a boy into manhood (Pl. 31). Known by the Mahuna Indians of Southern California as *qui-qui-sa-waal*, it was a prime medicant against the venom of the rattlesnake.

The primary attribute of this plant is that it provides the trance state for passage of a youth into manhood, to sustain a person during grief, or to simulate the death and resurrection necessary to the shaman. Only in the trance state can there be a communion between man and God. This is almost a universal phenomenon associated with shamanism. Zuni priests chew the root and put powdered root into their eyes in order to commune with the gods that will bring rain. Among the Yumans it allows a man to gain power and predict the future. These belief systems seem to have originated with the Shoshonean Indians of southern California and spread north. They are basically Uto-Aztec, but their practices can be traced through many tribes as far north as the San Joaquin Valley.

Among the Diegño and Luiseño, *Datura* was given only once in a lifetime at the age of puberty. This narcosis was achieved by drinking the powdered *Datura* root in warm water. *Toloache* would stupefy the boy for a period of one to three days, a time that they regard as holy and during which they will have a dream that is special to them, according to the account of Kroeber. Two months after this divine dream, the boys undergo the rite that is to fully separate them from childhood. Symbolically they have undergone a ritual of dying and being reborn that is the common denominator in diverse cultures where ritual use of hallucinogens is prevalent.

In the eastern United States the earliest settlers recorded in 1705 a peculiar ceremony that brought a boy to manhood through the use of *Datura stramonium*, then known as James Town Weed and later jimsonweed. The unfamiliarity of Robert Beverly with the "thorn apple" that turned a group of soldiers into "natural fools" for eleven days would seem to reinforce the belief that this species of *Datura* was of New World origin. The Algonquin tribe of the eastern woodlands used *wysocean*, *Datura stramonium* root in solution, to keep their initiates into manhood intoxicated for eighteen to twenty days. If at the end of this time they had any recall of the earlier life as a child, a second such ordeal was necessary. A stronger dose would be given if such were necessary, and this would more frequently result in the death of the initiate. In either case, so prolonged a period of trance would require that the boy be given numerous doses of the solution. Resemblances between the eastern and western rites are very strong.

A rhizomatous perennial common throughout moist temperate regions of North America and Europe is the sweet flag, *Acorus calamus* (Fig. 46). Oils found in the thick rhizome have a fragrance reminiscent of patchouli oil, and for that reason are sometimes harvested to be used in perfumes. On both continents it has had a history in medicine as a stomachic and carminative as well as being a palatable vegetable when roasted. Europeans have also been known to candy the sliced rhizome as one would ginger. Hoffer and Osmond reported on Indians who used the

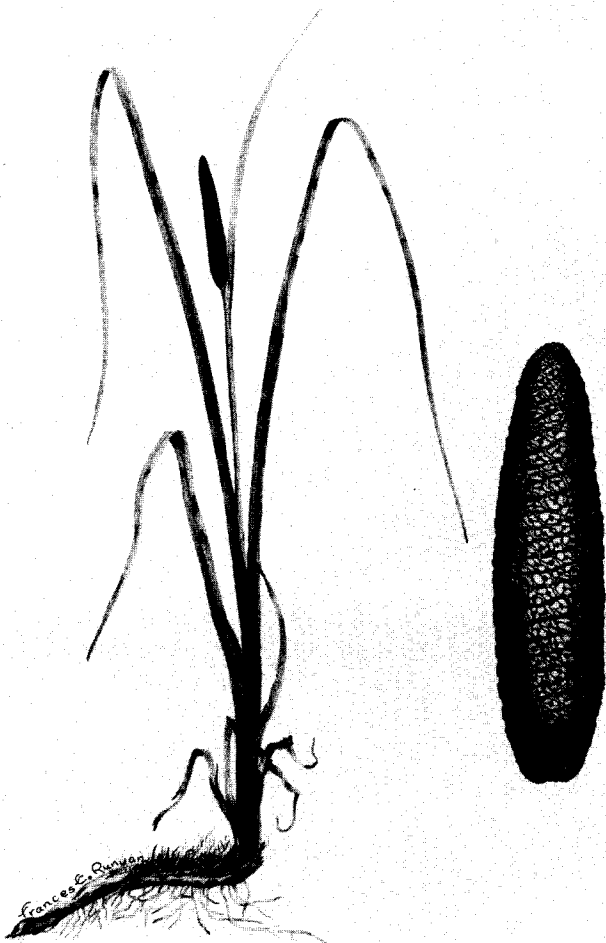


FIG. 46:
Acorus calamus

root to alleviate fatigue on long treks. Some users have described themselves as walking above the ground. Experiments with naive subjects demonstrated an LSD-like experience when they were given the oil expressed from the root. Strong visual hallucinations accompany this experience. Asarone and beta-asarone seem to be responsible for the effects. They do have a chemical structure that suggests mescaline; however, when asarone alone is administered, the psychotomimetic effects have not been demonstrated. Asarone can form tri-methoxy-amphetamine in vivo by amination. This does not happen regularly. The potency of this oil from the rhizome, measured as the quotient of the effective dose of mescaline divided by the effective dose of asarone determined by human titration is eighteen (assuming 3.75 milligrams per kilogram as a base). The Cree Indians of Canada have long used this fragrant rhizome that still eludes the chemist in his attempt to characterize the chemical combinations that create the effects of a hallucinogen.

The ethnobotany of the Hopi, so well documented by Alfred Whiting, makes

mention of a divinatory root belonging to the four o'clock family (Nyctaginaceae). Growing on hillsides at elevations of 2,500 to 6,500 feet in Arizona, *Mirabilis multiflora* (*Quamoclidon multiflorum*) extends into Utah, Colorado, and north Mexico (Pl. 32). Among the rocks and shrubs, one encounters this spreading plant with bright magenta flowers nestled in dark green foliage. The Hopis used the root for stomach ailments, but a Hopi "medicine man" uses a large amount of *so'ksi* or *so'kya* by chewing on the root. This allows him to make his diagnosis and permits the expulsion of evil spirits in his patient. Chemical analyses are lacking to confirm this alleged intoxication.

MEXICO AND CENTRAL AMERICA

According to a myth of ancient Greece, in Hades there was a river named Lethe, whose waters when drunk induced forgetfulness and oblivion. In the highlands of Mexico, the natives have found a Lethean draught in the foliage of an attractive shrub, *Heimia salicifolia* (Pl. 33). Although the plant has a range that extends north to Mexico and south to northern South America, it is used only in Mexico. An intoxicating beverage *sinicuichi* is prepared by crushing the wilted leaves in water and putting the juice in the sun for about three days to ferment. A cup of this beverage produces a vision that is typically overcast in yellow, and for this reason it is sometimes known by the name "plant of the yellow vision." A mild euphoria overcomes the participant and microscopia (microspia) accompanies the visionary state. Auditory hallucinations are common, and they may consist of sound displacement or the total exclusion of sounds. In this state it is believed that there is a psychic regression to earlier events, and the supernatural effects extend to recollection that goes beyond normal recall. There is apparently no hangover or any other unpleasant side effects. The rather immediate sensation of cold, hypothermia, soon passes. As *herva da vida*, the plant figures prominently in folk medicine in several areas. *Heimia myrtifolia* and *H. syphilitica* are treated as geographical variants of this species and as such probably do not deserve specific rank.

Diaz advanced the suggestion that *sinicuichi* is of Náhuatl origin as it is known also as *sinicuitl*, which may devolve from *xonocuilli* of the Aztecs. No entry under this name is to be found in the Badianus Codex, but the possibility of this being a plant of the Aztecs is certainly intriguing, for *sinicuichi* (*sinicuil*, *sinicuiche*, or *sinicuilche*) refers to other narcotic plants such as *Erythrina*, *Piscidia*, and *Rhynchosia*. The linguistic and ethnobotanical implications should be investigated.

Three investigators have shown the following alkaloids present in *Heimia* leaves: cryogenine (vertine), lythrine, heimine, sinine, lythridine, nesodine, and lyofoline. The most active of these would seem to be cryogenine, which is anti-cholinergic, anti-spasmodic, and tranquilizing. None of these attributes totally characterizes the hallucinogenic state induced by the fermented leaf in water. Experiments have shown additional medical attributes of stabilizing blood pressure and relieving experimentally induced anxiety states. Since the plant is a fairly common ornamental shrub in the southwestern states, its popularity as a legal hallucinogen has grown, and information on it is widely circulated.

"Peyote" is a corruption of the word *peyotl*, which in Náhuatl means silk cocoon or caterpillar's cocoon according to the 1571 *Vocabulario* of Alonso de Molina. The reference doubtless refers to the wooly center and interior of the plants *Lophophora williamsii* and *L. diffusa* (Pl. 34). The earlier species designation of *L. lewinii* as distinct from *L. williamsii* was made by Hennings of the Botanical Museum in Berlin, who treated both as being of the genus *Anhalonium*. Hennings' identification was later regarded as being in error, as he worked with a dried specimen and his identification was taken to be an age variant. Hennings himself had doubts about his ability to make a morphological distinction between the two. However, in 1898 Charles H. Thompson of the Missouri Botanical Gardens grew both species and decided that based upon living specimens, *L. lewinii* was "no more than an unusual form of *L. williamsii*. . . ." More recently, chemical characterizations support the treatment of the genus as being comprised of two variants that may be treated as species or subspecies, *L. williamsii* and *L. diffusa*. The latter, taken to be the ancestral species, may be morphologically distinguished with little difficulty. Indians of Mexico have names for four different variants they are able to distinguish in their own taxonomies. Some botanists would propose these ecotypes as four or five subspecies.

An unfortunate aspect of the use of the term peyote (*peyotl*) is that it is broadly applied in Mexico to diverse genera and species of cacti: *Strombocactus disciformis*, *Astrophytum asterias*, *Roseocactus (Ariocarpus) fissuratus*, and *Pelecyphora aselliformis*. That is not to say that all of these species are psychotomimetics, but alkaloids have been found in all but *Strombocactus*. In 1972 I reported on the efficacy of ingested *Pelecyphora aselliformis*, and subsequently it was determined that this species contained small amounts of the active alkaloid mescaline (Pl. 35). To confuse the matter even more, the composite *Cacalia cordifolia* and the succulent *Dudleya (Cotyledon) caespitosa* are also known as peyote and have no active principles. The importance of Latin binomials is made evident in this excess verbiage created through the use of a common name. There is no doubt, however, that the sacred *peyotl* of the Aztecs was *Lophophora* and that it served as mediator between these people and their gods.

Lophophora is a singularly unimpressive plant appearing as a grey-green knob about the size of a golfball or baseball except for the large taproot, which is most of the plant. Traditional gathering practices involved removing the above-ground portion from the taproot, which would permit cloning and the subsequent emergence of many cacti where there had been only one. Contemporaneous uprooting of these plants threatens to eliminate these two species from their habitats, which would take a sacrament from people who employed this plant in a sacred context before Christianity was known in the New World. After successfully holding out against both religious and legal authority for over four hundred years, it would be a tragedy to deprive these people of a sacrament by rapacious gathering on the part of individuals who do not understand the threat that they pose to the religious and social structure of Indians of North America. Canadian/US use of peyote was not widespread until the end of the nineteenth century. Among the Tarahumara, Cora, and Huichol Indians of Mexico,

the practice is ancient, deriving from the Chichimecas and Toltecs of 300 B.C.

In the mid-sixteenth century, Sahagún, author of the Florentine Codex, spoke of the Teochichimekas (genuine Chichimekas) who knew of *peyotl* and used it to see frightful visions. Their meetings at night were followed the next day by copious tears and the return of reason. Sahagún indicated that these people were given courage by the plant and that they believed that it protected them from danger, hunger, and thirst. He failed to see the religious context. Greater interpretation was given by Francisco Hernández, personal physician to the King of Spain. In his account of 1576 we read: "this root [sic] scarcely issues forth, but conceals itself in the ground as though unwilling to harm those who may discover and eat it." He believed it to be harmful to both men and women, who upon devouring it are able to foresee and predict things. This was, of course, taken to be satanic trickery and deceit that would have to be eliminated to protect the sanctity of the eucharist. It was also necessary to make inquiries about such practices in the confessional. Thus, in *The Road to Heaven* by Father Nicholas de Leon, the priest is to ask the penitent: "Do you suck the blood of others? Do you go about at night to invoke the aid of demons? Have you taken peyotl or given it to others to drink in order to discover secrets or the whereabouts of stolen or lost property?" The eating of peyote was equated with cannibalism, but the pragmatism of the Catholic Church prompted a compromise of sorts so that by the year 1692 the Coahuila Indians had established a mission under the name of *El Santo de Jesus Peyotes*, indicating that the plant was tolerated if not accepted. The plants were brought to the altar of these missions in order to further sanctify them, and the traditions became inextricably enmeshed in most areas. By 1900 Lumholtz documented the Christian elements in the peyote rites among the Huichol. This work was extended by Myerhoff and Furst, resulting in a film that preserves many of the elements that will undoubtedly be lost in a few more decades. The Huichols become the most important link in this tradition in that, as Furst has pointed out, they remained relatively autonomous from colonial military rule and ecclesiastical pressures. As a generalization, one may say that the peoples of Meso-America have preserved more of the elaborate pre-Conquest ritual than have the Indians of North America.

Ceremonies that have developed around the use of peyote are diverse, and yet they have several aspects in common. There is always a fire burning, groups rather than individuals partake of the sacred plant, chanting and singing go on continuously except for a sermon in most North American tribes which ends the ceremony. During the ritual as many as sixty-four "buttons" may be consumed, although the usual number is from four to twelve. The "buttons" are formed by slicing and drying the above-ground portions of the plant. This fibrous slice will dissolve in the mouth, except for the fibers, and is usually swallowed whole. Sometimes these are soaked in water and the liquid is consumed. Chewing the button to break it down is less common. Perhaps the most intriguing mode of use comes from a report given by Timothy Knab to Peter Furst in which Huichol shamans take an infusion of peyote rectally by the use of a deer bladder and a femur bone. Clysters have been used in diverse areas of the world for ritual intoxication involving *Datura*, *Nicotiana*, *Anadenanthera*, *Banisteriopsis*, and *Agave*. The reason is usually to avoid the

physical discomfort of ingesting material that is basically unpleasant. Among the Algonquins the protracted *Datura* intoxication was more easily achieved by maintaining the state through enemas. It would be very difficult to get a person in a trance state to drink without aspiration or other problems, whereas the clyster presents a simple solution. Occasionally fresh peyote juice is consumed when the plant is encountered in the field. Dried or fresh, it is always bitter and astringent, and the initiate is likely to suffer nausea, anorexia, and insomnia as well as feeling a dull headache. Some of these reactions are undoubtedly based upon anxiety.

Culturally conditioned expectations constitute a primary element in the peyote experience. Heinrich Klüver has investigated the syndrome of effects and found that there are certain constants in peyote intoxication that would help to explain behavioral responses that are similar and the convergent themes in interpretations of the experience in unrelated cultures. Klüver's three basic levels are form constants, size and shape constants, and the level of change in spatio-temporal relationships. Regardless of the elaborate detailing of the experience in more personal terms, these themes are reiterated. Mescaline, the primary hallucinogen, is capable of mimicking these constants and the entire experience. Klüver's detailed studies are remarkable in that peyote intoxication is one of the most complex of the psychotomimetic experiences in terms of the range of hallucinations, which include the vivid color alterations, auditory changes, taste and olfactory sensations, macroscopia and microscopia, levitation, tactile hallucinations, time-space alterations, and the experience of "selflessness" or depersonalization. Both Klüver and LaBarre have stressed that the mescaline experience is not the peyote experience.

The Indian participant in the peyote ceremony is shown the Way, the road to the good life, and he enjoys a oneness with his fellow man and with nature. As Lewin reported, he is transported to a new world of sensibility and intelligence. The peyote experience is essentially religious as it is practiced by Indians. Contrary to this we have the hedonistic experience of the European or non-Native American. The account of Havelock Ellis is exemplary: "visions became distinct and green stones, ever changing . . . the air around me seemed flushed with vague perfumes, producing with the visions a delicious effect . . . a kind of removal from earthly cares and the appearance of a purely internal life which excites astonishment." Here we have documentation of an experience that is not considerably different from some of the accounts of hashish eaters and similar also to mushroom intoxication.

Thus, despite constants, the experience is dictated in great part by what the individual brings to it. For the Indians it is a very sacred experience. Contrary to the ethnocentric assertion of Lewin that it "brings the Indian out of his apathy and unconsciously lead[s] him to superior spheres of perception, and he is subjected to the same impressions as the cultivated European . . .," we may say that the understanding of their environment by Native Americans surpasses that of the non-native who seeks to modify it rather than attain a more profound understanding. It is precisely this lack of perception by the non-native that led a group of North American Indians to petition the Supreme Court of the United States in order to preserve their sacrament. This culminated in the founding of the Native Church of North America in which peyote remains as the central sacrament to promote this

contemplative state of introspection and union with God, man, and nature. It permits a return to the principles of a people who have been rightfully disenchanted by a way of life that has been forced upon them by non-natives. No elaborate tests or measurements will reveal the impact that peyote has in these age-old rituals. Even when used as a medicine, it cannot be understood only as a therapeutic agent; peyote remains sacred as a source of life and power. Other mescaline-containing cacti used ritualistically may be found in the section on South America.

Mescaline is a name that was given to the most active alkaloid isolated from *Lophophora* by Heffter in 1894. The choice was perhaps unfortunate in that it derives from the Náhuatl *mexcalli* indicating the *Agave americana* (also called century plant or maguey). From this Aztec word there arose the Mexican term *mezcal* (mescal), designating alcoholic beverages made from several species of *Agave*. Also at a very early date, the practice of putting the red bean-like seeds of *Sophora secundiflora* in *mezcal* to make it more intoxicating was a common practice (Pl. 36). These seeds from the shrubby legume *Sophora* became known as mescal and *mezcal* because of their use as a narcotic adulterant of the alcoholic beverage derived from the *Agave*. The term mescal was adopted by Heffter, because it was in early use to characterize dried slices of peyote, which were "mescal buttons," just as the *Sophora* seeds were "mescal beans." It would seem that the practice of wearing mescal seeds sewn on a peyote leader's vestments would explain the etymological connection. Peyote gradually replaced the mescal bean as the hallucinogen of preference among the people of north Mexico and the United States, because it is less toxic than *Sophora* seeds, which contain cystine. Cystine is a toxic pyridine that is closely related to nicotine and is found in several other legumes that are used for ritual intoxication. It produces nausea, convulsions, and sometimes death. Evidence for the association between the peyote ritual and the *Sophora* ceremonies may be found on the garments of the peyote leader among the Kiowa Indians. Some of the Plains Indians still consume the bean, but the practice is diminishing. One half of a bean is enough to intoxicate.

Archaeological sites dating before A.D. 1000 suggest a ceremonial use of *Sophora* seed or mescal beans. Among the Plains Indians mescal beans have been used as a divinatory agent to predict, as a vision-inducing agent in initiation rites, and as a stimulant and ritual emetic in other ceremonies. As early as 1539, the Spanish explorer Cabeza de Vaca mentions mescal beans as an article of barter among the Texas Indians, and in 1820 the Stephen Long expedition reported that the Arapaho and Iowa Indians were using the beans as a medicine and a narcotic. Both the Kikapoo and Comanche tribes used an infusion of *Sophora* seed for earache and eye diseases. These magical beans are said to have sexes and to breed. If one puts aside a dozen beans, he should not be surprised to return to this same cache and find several dozen beans. Being magical, they were treated as amulets and when worn, they protected the wearer against bodily harm.

In the spring the Iowas roasted the beans by a fire until the coral orange color turned to yellow. Then the beans were pounded into a yellow meal, and water was added to it. The Iowa red bean ceremony involved a spring purification ritual in which all tribesmen drank this infusion and then vomited copiously. This was a

form of *limpia* or ritual cleansing that may be found throughout the Americas. It is more than ridding the body of toxins, it is a symbolic and physical purification brought about by a sacred agent.

Frijolitos, or *Sophora* seeds, have often been confused with the seed of *Erythrina flabelliformis* and related species in this genus (Pl. 37). Although the trees are quite distinct, the seeds bear a superficial resemblance to each other. In Mexican markets both seeds may be found for sale, the former as *frijolitos* and the latter as *colorines*. While *Erythrina* occurs in the tropics and subtropics of both the Old and New worlds, not all species contain indole or isoquinoline derivatives that present a potential for hallucination. The tetracyclic ring known as erythran is common to those that are psychoactive, and the effect seems to be predominantly that which is elicited by curare toxins that are used as tropical arrow poisons.

Were it not for the absence of black, this seed might be confused with yet another member of the pea family, *Rynchosia*. Two species of this genus are in common employ on the slopes of Popocatepetl, *R. pyramidalis* (*R. phaseolides*) and *R. longiraceomosa* (Fig. 47). There is considerable antiquity in the practice of using this seed as a narcotic, for it figures prominently in some Aztec paintings together with hallucinogenic mushrooms. In the Tepantitla fresco (c. A.D. 300–400), *Rynchosia* seed may be seen falling from the hand of the rain god, Tlaloc. The name by which this seed is best known, *piule*, is also used to indicate all of the hallucinogenic morning glory seeds (*Ipomoea* spp.). The narcotic in these red and black beans is as yet unidentified, but physiological testing has shown the effects to be like those of curare, further linking this seed to *Erythrina*.

Spaniards have never been fanciers of mushrooms, so it is easy to understand their disgust when, as Christian conquerors, they found the Aztecs using mushrooms as a sacrament under the name *teonanacatl* or "God's flesh." Sahagún, being a sixteenth-century Spanish friar, and the king's physician Hernández gave written accounts of loathsome mushroom rituals that "provoke lust . . . cause not death, but madness . . . and bring before the eyes wars and the likeness of demons." Sahagún included in his denunciation some drawings of these pernicious fungi and the devil inspiring them. Needless to say, *teonanacatl* was banned by the church as contributing to pagan behavior and idolatry. It was particularly irksome to the conquerors that these mushrooms should be used in a sort of communion ritual. On state occasions, such as the coronation of Montezuma in 1502, hallucinogenic mushrooms were incorporated into the feast.

The practice of venerating mushrooms dates back to around 100 B.C. and is based in part upon the discovery of nine miniature mushroom stones found in a late pre-Classic to early Classic site near Guatemala City. Progressive finds ranging from Vera Cruz in the north to El Salvador and Honduras in the south have indicated an extensive mushroom cult in very early civilizations. Nineteenth-century stones were interpreted as vestiges of phallic worship. This concept was not discarded until the end of the nineteenth century, when more finds established the nature of the idols as mushrooms. Frequently these were associated with a young woman leaning over a *metate* and grinding mushrooms, or there was an association with the toad (*Bufo marinus*), whose skin contains the narcotic bufotenine (Fig. 48).



FIG. 47: *Rhynchosia longiraceomosa*



FIG. 48: Guatemalan mushroom stone and girl with a metate

It was not until 1936 that a non-Indian, Roberto J. Weitlaner, witnessed the holy rites involving *teonanacatl*. During the years 1938–39 Richard Schultes, then beginning his career as an ethnobotanist, was doing field work in the area of Oaxaca and sent specimens of the sacred mushrooms back to Harvard. Many years later they were to be identified as *Psilocybe caerulescens* var. *mazatecorum*, *Panaeolus companulatus* var. *sphinctrinus* and *Stropharia* (*Psilocybe*) *cubensis* (Pl. 38).

During several successive trips beginning in 1953, R. Gordon Wasson explored the area of Oaxaca and environs searching for fragments of this intriguing and incomplete puzzle. As he was a devoted amateur schooled in mycology, Wasson enlisted the aid of Roger Heim, the world-famous expert on fungi from Paris, and the chemist-naturalist Albert Hofmann of Sandoz Laboratories in Basel, Switzerland. Wasson wrote several important articles on their experiences as participants in mushroom ceremonies among the Mazatecs and recorded these on tape and film. In addition to enlarging the number of known species used, they described frescos depicting mushroom worship going back to A.D. 300 and mushroom stones from Guatemala dating to perhaps 1000 B.C. Their fungal finds included: *Conocybe siliginoides* from dead tree trunks, *Psilocybe mexicana* from wet meadows and pasturelands, *Psilocybe aztecorum* growing in moist fields, *Psilocybe zapotecorum*, known as "crown of thorns" and indigenous in marshlands, *Psilocybe caerulescens* var. *mazatecorum* which grows on refuse, *Psilocybe caerulescens* var. *nigripes*

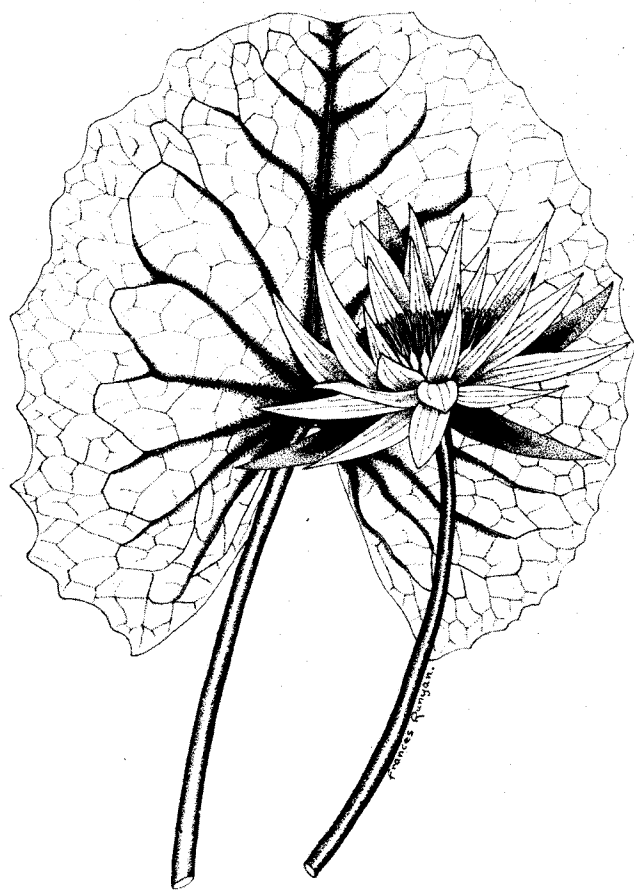


FIG. 49:
Nymphaea ampla

called the "mushroom of superior reason," and *Stropharia (Psilocybe) cubensis*, which is often found on decaying plant material.

While mushrooms were doubtless consumed in rituals over much of Mexico and Central America in ancient times, the only tribe definitely known to have used *teonanacatl* is the Chichimecas. In Oaxaca today, six tribes consume sacred mushrooms: Mazatecs, Chinantecs, Chatinos, Zapotecs, Mixtecs, and Mijes. Other tribes using the sacred mushrooms are the Nahoas of Mexico, the Tarascans of Michoacan, and the Otomis of Puebla. More recently it has been suggested that the use of the mushrooms in a ritual fashion by the Chol and Lacandón Maya may be a vestige of an earlier Mayan ritual that may have disappeared for a time and then been readopted. Although most authorities on Mayan civilizations have in the past spoken only of tobacco as an intoxicant, recent studies by Robertson in 1972 have documented the use of mushrooms by Lacandón priests within the seclusion of

small temples at Yaxchilán. This, combined with evidence presented by Dobkin de Rios in 1972 and 1974 on hallucinogenic water lilies (*Nymphaea ampla*) and narcotic toad skins, suggests that the structure of Mayan civilization may require new interpretations (Fig. 49). Peter Furst in 1972 did much to put the role of mushrooms and the toad into an Aztec cosmology, and in the subsequent two ensuing years this anthropologist identified a number of mushroom effigies in ceramic pieces of tombs of west Mexico some two thousand years ago. The burgeoning reports in recent times suggest that much of the history of the peoples of ancient middle America will have to be rewritten in light of the prevalence of psychoactive plant and animal material that was previously unknown in the psychohistory of these civilizations.

The Sandoz Laboratories of Switzerland were successful in 1958 in isolating psilocybin and psilocin from *Psilocybe mexicana*, and subsequently these were found to be the active principles of the various genera comprising "magic mushrooms." Psilocin is 1.4 times as potent as psilocybin. Hofmann and his colleagues found qualitative similarities between the effects of these mushrooms and LSD or mescaline reactions. They believe that psilocybin and LSD create similar psychic manifestations by acting on some common mechanism. It is to be noted that the amount of psilocybin and psilocin in *Psilocybe cubensis* is considerably higher than in other species. Hofmann's reported vivid hallucinations with thirty-two specimens of dried *Psilocybe mexicana* are easily achieved by using three or four dried *P. cubensis* specimens. The period of intoxication is approximately four hours.

Effects of psilocybin and psilocin include colored hallucinations, muscular relaxation, occasional hilarity, inability to concentrate one's attention, alteration of time and space perception, and a feeling of isolation from one's environment. The sensation of a new reality has passed, the body is in a state of physical and mental lassitude. Some investigators report depression upon leaving the intoxicated state. I believe that this relates directly to the quality of the experience, for the new vistas, levitation, and personal revelation can be exhilarating even in a state of physical exhaustion. The experience varies from one time to another in the same individual, and most certainly from person to person. As with LSD, these mushrooms should be useful in experimental psychiatry. They are pleasant to consume and produce no offensive toxic reactions such as vomiting or vertigo. The intoxication is not a stupor, but a period of a new consciousness and a new reality. These are sensations that have been experienced in sacred ceremonies that have been conducted in Mexico and Central America for centuries or perhaps even millennia.

Present-day ritual among Mazatec curanderos involves the incorporation of a great deal of ritual from the Catholic Church, which tried without success to eliminate the detested fungi. Chanting to the saints of the church and the incorporation of litanies are undoubtedly post-Christian elements in Mazatec ritual. It is difficult to separate out those ritual and musical elements that are authentic. The beating of arms against the rib cage and thighs as well as the clapping of hands during the ceremony establish a music over which chanting and singing are heard. During the trance the mushroom speaks through the curandera and she, appropri-

ately, speaks in the several voices of the persons she has become. A parish priest in 1629 recorded a list of the word formulas employed by the Aztecs in a mushroom invocation. This record reveals nine personages for the individual conducting the ceremony, a style now paralleled in the Mazatec curandera's mushroom ceremony.

Oaxaca has, perhaps, more knowledge of mind-altering plants per square mile than any other region of the world, and yet the Indians of Oaxaca have uses for local plant species that may not extend beyond a given tribe even though the plant may be ubiquitous. Such is the case with two bizarre puff-balls *Lycoperdon marginatum* and *L. mixtecorum* (Figs. 50 and 51). More than one hundred species of this genus may be found in the temperate forests at high altitudes. The Mixtecs, living at an altitude of about two thousand meters and above, collect the two aforementioned species, which upon ingestion create a semi-somnolent state in which voices and echos are heard. Mixtecs believe that if they listen to the voices they may expect answers to the questions posed. These puff-balls differ from the magic mushrooms in that the hallucinations may be purely auditory and without visual content. *Lycoperdon mixtecorum*, known as *gi-i-wa* (fungus of the first quality), is the preferred of these two fungi. *Lycoperdon marginatum*, or *gi-i-sa-wa* (mushroom of the second order), has a decided odor of fecal matter. One would expect the nearby Mazatecs to utilize one or both of these as surrogates for their mushroom rituals, but they apparently do not have the regard for *Lycoperdon* exhibited by the Mixtecs. Other *Lycoperdon* species are used by Brujos among the Tarahumara for evil purposes. A report made early in this century by Chestnut, who worked among the Indians of Mendocino County in California, indicated that *Lycoperdon* was a plant important to the shamans of this area in working their magic. Also, we have mention made by H. W. Ravenel in 1869, "It has been mentioned by medical writers that the spores of the puffballs have narcotic properties, and it is an anaesthetic agent, acting somewhat like chloroform when inhaled." Ravenel reported that a colleague in South Carolina made several meals on *Lycoperdon* and exhibited well-marked evidences of narcosis. This was corroborated by two of his friends. In Canada *Lycoperdon pyriforme* was used to arrest sleep! A thorough assay of this intriguing genus in all geographical areas is in order. One of the most bizarre uses for a puff-ball is the burning of dried *Calvatia lilancina* (Lycoperdales) near hives and honey sources to intoxicate bees without killing them.

The Mazatecs may select an exotic naturalized plant while disregarding an indigenous plant that they know to be psychoactive. *Coleus* species all came to America from the Old World tropics. *Coleus pumila* and *C. blumei* are both native to southeast Asia and are reported to have found favor among the Mazatecs as vision-provoking plants (Pl. 39). These members of the mint family are common in most ornamental gardens throughout the world because of their highly colored and showy foliage. Among the Mazatecs, *Coleus pumila* is called *el macho*, or the male, and *C. blumei* is called *el nene*, or child, and also *el ahijado*, the godson. Psychotropic effects have not been able to be substantiated by testing, nor has any psychoactive compound been isolated from either species. We have only the reports of R. G. Wasson, which were unable to be verified by J. L. Diaz in his excursions into the Sierra Mazateca.

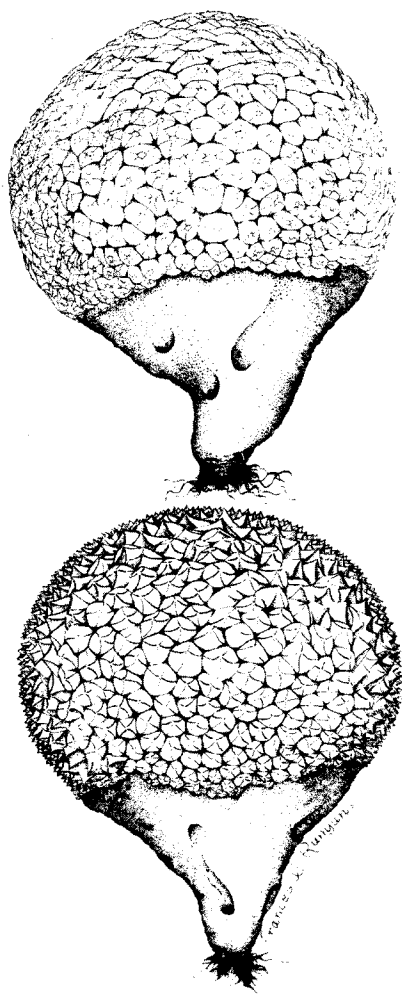


FIG. 50 & 51:
Lycopodium mixtecorum
Lycopodium marginatum (bottom)

The foregoing report would be more disconcerting were it not for another member of the mint family used as a divinatory among the Mazatecs for which there is no chemical substantiation. *Salvia divinorum*, or the sage of the seers, is found growing only in the forest ravines of northeastern Oaxaca (Pl. 40). The plant propagates itself by the decumbent branches falling to the ground and rooting. It seems, however, to be in cultivation and to be absent in areas where it is not under the care of man. The material sent by Wasson to Carl Epling at the University of California at Los Angeles in 1962 was improperly described as having deep-blue flowers that were slightly pubescent and a bluish calyx. Having grown this plant for

over ten years, I have brought it into flower on several occasions, and it is necessary to amend the description. The plant flowers only when the branches are about seven or more feet in length, at which time it is sprawling. The leaves are an almost iridescent green, and the stems are quadrangular with wings that are crenate. It is in all aspects herbaceous. The flowers are pure white and densely tomentose. They are borne in a violet calyx tube and do not set seed even when pollinated. The entire panicle is of a violet color contrasting sharply with the white, sigmoid corollas that protrude from the tube and are up to thirty millimeters in length.

This spectacular member of the mint family is known to the Mazatecs as *hojas de la Pastora* or *hojas de la Maria Pastora* (leaves of the Shepherdess or leaves of Mary the Shepherdess). Wasson became interested in this plant when investigating an herb called by Sahagún *poyomatli* which Juan de Cárdenas wrote of as *poyomate*. This was one of the plants associated with hallucinations and magic by Beltrán in his book *Medicine and Magic*. Although the records in Colonial Mexico indicate that the divine plant was used in all of its parts (with the exception of the seed, which goes unmentioned), contemporary Mazatecs use only an infusion of the leaves that have been ground in a metate. The extremely bitter green liquid often induces vomiting, after which visual hallucinations include vivid patterns of color that seem to be in constant motion. These visions come quickly upon drinking the infusion and last only for a brief time. Curanderas have chants appropriate to the use of *Salvia divinorum*, but they have another such ceremony when this sage is used with psychotomimetic mushrooms. These two ritual incantations and ceremonies parallel each other.

As many as one hundred crushed leaves in water may be given to a sick person by a curandera, and in about fifteen minutes the ailing person will be in a trance-like state and able to recite the cause of his illness. The same plant liquid is used to disclose theft or evil doing among villagers. This practice extends beyond Mazatec territory into the contiguous Cuicatec and Chinantec areas. Plants of *Salvia divinorum* are maintained in these areas by asexual propagation. Shoots are broken from the mother plant and inserted into the rich soil along stream beds where they quickly root. When gathering the plant for ritual use, Indians avoid those plants that have been attacked by snails and various caterpillars, for these would be inappropriate for use in ceremonies associated with prayers to the Virgin Mary, who is the patroness of this plant. Sometimes the leaves are not ground in a metate, but are nibbled in pairs using the incisor teeth. The precise ritual seems yet quite vague, for the Mazatecs are reluctant to reveal such information.

If indeed the plant of the Aztecs, *pipiltzintzintli*, is *Salvia divinorum*, it represents one of the foremost ethnobotanical discoveries of this century for reason of both plant and ceremonies attendant with it having eluded anthropologists and botanists for such a long time. Although chemical investigations in several laboratories have been conducted for over a decade, the active components remain uncharacterized. Physiological testing on animals reveals the assertions regarding the psychoactive character of the leaves to be true. A mild euphoria and vertigo generally follow the initial visual phase of intoxication. Some experimenters have indicated a period of weightlessness during the first critical intoxication in which

dancing colors are in evidence. The extreme bitterness of the leaves will probably preclude it from becoming a popular hallucinogen in newer drug subcultures.

Snake plant or *coaxhuatl* was the vine Aztecs used to obtain a small cache of seeds known as *ololiuqui*. Growing as a tall shrub bearing white tubular flowers in great pendant panicles, it was first described and illustrated by Hernández, who wrote of it between 1570 and 1575. A Spanish record of 1629 reported that the seed in an infusion deprives a man of his senses and is very powerful. Those who used it were said to have communion with the devil, to believe in the owl, and to suck blood. Their deity resides in these seeds with which they become intoxicated and commune with the devil, according to this account. Seeds of *coaxhuatl* were venerated and placed in ancestor figures. It is no wonder that priests worked diligently to eradicate the practice which they interpreted as communion with the devil as well as elements in diabolical magic. There is further evidence that *ololiuqui* was mixed with tobacco and venomous insects that had been burned in order to make a mixture that could be rubbed on the bodies of priests to induce what was interpreted as a satanic delirium. After several centuries of neglect, the issue was taken up and the plant was variously identified as *Datura* and other members of that family (Solanaceae).

In 1897 Urbina made the suggestion that *coaxhuatl* was *Ipomoea sidaefolia*, a plant that we would now call *Rivea corymbosa* (Fig. 52). In 1939 Reko, who had accepted this identification, united with Schultes to collect botanical specimens of a plant being used in ritual divination by a Zapotec witch doctor in northeastern Oaxaca. It was found that the plant of the Aztecs, now widely used throughout Oaxaca, was indeed *Rivea corymbosa* of the morning glory family. In 1937 Santesson had reported a narcosis in mice and frogs using seed of *Rivea corymbosa*. This was followed by some daring investigators experimenting on themselves with results that varied from reports of increased visual sensitivity and listlessness to reports of no discernible effects after the consumption of as many as 125 seeds. Hofmann in 1960 uncovered the secret of the *ololiuqui* seeds. They contained amides of lysergic acid that are characteristic of those found in the European fungus *Claviceps purpurea* as well as *Penicillium* and *Rhizopus*. Delta lysergic acid amide (ergine), d-isolysergic acid amide (isoergine), chanoclavine, lysergol, and elymoclavine were found. The establishment of *Rivea corymbosa* as both a hallucinogen and as the plant of the ancient Aztecs was ascertained.

A further study of Zapotec ethnobotany by MacDougall in 1960 revealed that yet another type of morning glory was being employed in the same way as *Rivea*. The vine *Ipomoea violacea* (c.f. *I. tricolor*) produces small black-pointed seeds in the confines of a papery-thin tan capsule (Pls. 41 & 42). These *badoh negro* seeds were suggested by Wasson to be the *tlitliltzin* of the Aztecs. The Zapotecs grind seeds of both *Rivea* and *Ipomoea* together in a metate, wrapping the meal in a cloth sack and soaking it in cold water. The resulting infusion provided the curandera with information about the illness of a patient, a troublemaker among her people, or the location of a lost object. This is certainly a devolvement from the magico-divinatory rites of the Aztecs. The use of LSD-25 (d-lysergic acid diethylamide) as a



FIG. 52:
Rivea corymbosa

recreational drug and in therapy is in a direct lineage with these magical seeds. Characteristic visions of the "little people" are common to those who use morning glory seeds, a condition that we would refer to as microscopia and which accounts for the prevalent reports of elves, leprechauns, gnomes, hombrecitos, and all of the other tiny people that fill folk tales throughout the world. Many hallucinogens are capable of producing this effect, and one may expect one day to read a treatise on the chemical basis of numerous and diverse folk tales.

Cultigens, which are varieties of *Ipomoea violacea*, have attained a considerable popularity in continental United States because of their psychoactive properties. Among these are: Heavenly Blue, Pearly Gates, Flying Saucers, Wedding Bells, Summer Skies, and Blue Star. All contain amides of lysergic acid, and the effects are reported to be like those of a mild LSD experience. Recently, several major suppliers of these seeds have been dusting them with a noxious chemical fungicide prior to sale in order to discourage consumption by an experimental minority. Although warnings are placed on the packages, it would seem to be a slight deterrent to those

who wish to use the seeds, for in a few months enormous amounts of these seeds can be produced by growing the plant in any sunny spot. Attempts to place controls on the seeds have been abortive.

Controversy continues over the use of *Argemone mexicana* among the Indians of Sonora, Sinaloa, and Baja California. In a book entitled *Magical Poisons* published in Stuttgart in 1949, V. A. Reko mentioned Chinese living in Mexico using a "chicalote opium," which was reputedly derived from capsules of a hybrid between the opium poppy and the native *Argemone mexicana* or prickly poppy (Pl. 43). This seemed so unlikely that Varro Tyler, Walter Naumann, and Frank Vincenzi undertook an extensive study in which they attempted to hybridize these two genera. No seeds were obtained in repeated attempts at hybridization, and one may assume that the Reko conjecture was mistaken with respect to an opium-producing hybrid. However, the seeds of the prickly poppy are used as a narcotic in several areas of northern Mexico, and they do contain several isoquinolines, the basic skeleton of which is common to the mescaline-containing cactus *Lophophora* and the opium poppy *Papaver somniferum*. Earlier reports of morphine being isolated from *Argemone* are to be discounted, as they have not been substantiated. Protopine, found in *Papaver somniferum*, and berberine are both alkaloids of *Argemone mexicana*. While the hybrid theory may be laid to rest, the possibilities of *Argemone* seeds being psychoactive are worthy of further consideration. The oils are still regularly used in emesis, and the ritual of *limpia*, which involves inward cleansing in itself, induces a sort of euphoria.

The uses of *Datura innoxia* and related species in Mexico closely parallel those of the Zuñi Indians of the southwestern United States, and to a lesser degree the Algonquins of northeastern America, who knew the herb as *wysocan*. These parallels have already been touched upon. A most eloquent documentation of the ritual use of *Datura* among the Yaquis was made by Carlos Castenada in *The Teachings of Don Juan*. In this controversial book we learn that it is the herb that permits man to fly from place to place like a bird. The philosophy attendant with *Datura* use is most profound and cannot be reduced to a few elementary statements. A major difference between the Yaqui traditions and those practiced by Indians of the southwestern United States is the growing of one's own herb and the elaborate preparation and the rituals that accompany its use. It may be said that the shamanic tradition is generally stronger in Mexico and Central America and reaches a high point in diversity and complexity in South America. The native manipulation of plants by hybridization in Mexico makes the task of the taxonomist trying to identify species a sort of nightmare. It is convincing testimony to the involvement of man with this potent narcotic plant.

In his *Flora of Malaysia*, Burkhil reported that the labiate *Leonorus sibiricus*, commonly known as motherwort, was smoked in Malaya when *Cannabis indica* was not available (Fig. 53). This practice he traced to at least 1918 by way of his informant Boorsma. In 1976 Jose Diaz reported on this perennial mint under the name of *marihuanilla*. Diaz gives an account of this Siberian and Mongolian introduction finding acceptance in the state of Chiapas and surrounding areas. Three villages of Chiapas are especially involved in the use of the plant, both as a

psychotropic and in a tincture to treat rheumatic fever. The popularity of *marihuania* will doubtless increase as the pressure from local and federal authorities in Mexico to ban the use of *Cannabis* increases. The three alkaloids extracted to date are leonurine, leonuridine, and homorunine, which are suspected to cause the psychotropic effects. A related species, *Leonorus cardica*, of Europe and Asia has long been used in medicine as a nervine and to quiet hysteria under the name of common motherwort. It would seem that the entire genus merits further botanical and chemical inquiry.

In his book on *The Medicinal Plants of Mexico*, Martinez in 1945 referred to *Tagetes lucida*, a native marigold, as "narcotic and toxic" (Pl. 44). A number of reports have come out of Huichol territory indicating that the leaves of this plant are smoked to produce a period of tranquility. Other Huichols have indicated that the plant produces visions similar to those induced by *Lophophora williamsii*. *Tagetes lucida* is also known under the names *tumutsali* or *yauhtli*. *Yauhtli* was a plant sacred to the Aztecs and also known under the names *yyauhtli*, *yyahitlm*, *yyahhitl*; the script in the Badianus Codex is obscure. Sahagún mentions the plant in several early contexts, and one is very shamanic in content. *Tagetes lucida* was the bright yellow flowered herb whose leaves were possessed of much oil and great fragrance. Powdered leaves were thrown in the faces of captives to be sacrificed to the fire god *Xiuhtecutli* (*Huehueteotl*) during the festival of *Xocothuetzi*, the tenth

FIG. 53: *Leonorus sibiricus*

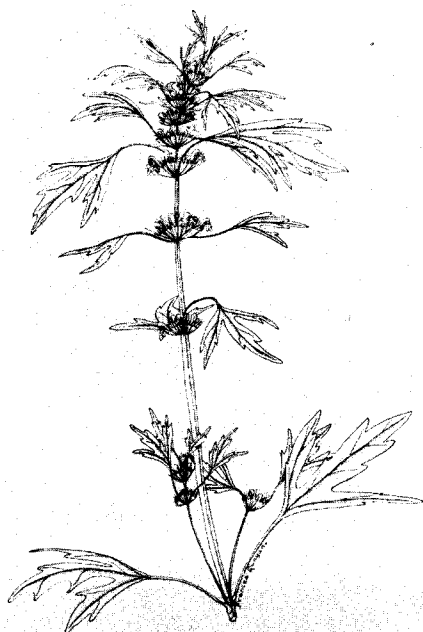
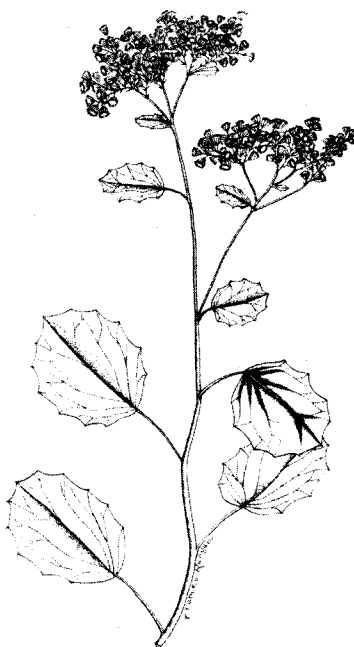


FIG. 54: *Senecio hartwegii*



month of the Aztec calendar year. This was done presumably to deaden the senses of the victims.

Tagetes lucida has long been used in ritual purification for cleansing the air. In a religious context it is often referred to now as the herb of the Virgin Mary. The fragrance is somewhat akin to licorice and chocolate. In the court of Montezuma it was one of the additives to his ritual drink of cacao. It is difficult to affirm or deny the reports of this plant as a narcotic in that they are so highly varied and chemical analyses are incomplete. The data, however, is not significantly different from that on nutmeg in terms of the erratic mode of action conditioned by oils present. In any event, the reports are too numerous in favor of *Tagetes lucida* as a Huichol narcotic to deny the worth of continuing chemical and ethnobotanical inquiry.

In the Badianus Codex the plant figured in plate 46 is labeled *ytzcuinpahtli*, which translates as dog medicine and has been identified as *Senecio canicida*. Ramirez in his *Materia Medica of Mexico* refers to the plant as *itzcuimpatli* and by the Spanish name *yerba de la puebla*. His identification is also *S. canicida*. Flores in 1886 in writing of a history of medicine in Mexico referred to this very same plant and stated it to be a narcotic. In the Badianus Codex it was a principal ingredient in a medicine used to relieve pain in the chest. Vélez in 1897 concurred with the earlier judgement of Flores and conducted a series of experiments with animals in which the extract of various species of *Senecio* from Mexico were administered as senecio-toxin in the form of crystalline alkaloid put into solution. This provoked a period of excitation followed by irritability, and ultimately death ensued after a partial paralysis. He noted that in humans the use of *Senecio* caused a period of excitement followed by delirium.

Senecios were included in that broad group of plants called peyote or *peyotl*. In describing the *peyotl* of Xochimilco and of the Zacatecs, Hernandez makes it clear that the plant he is referring to is not the cactus *Lophophora*, but *Senecio*, probably *S. hartwegii* (Fig. 54). This latter species is known also as Peyote of Tepic. Most of these senecios have been found to have psychotropic chemicals of a necine structure best characterized as neurotoxin. *Senecio* is also the identification made of some of the peyotes of the Tarahumara. We now need to know the exact role of the *Senecios* in induced psychoses. The material is not suitable for human experimentation, however, since it contains several chemicals that function as liver toxins and are extremely dangerous. Recent focus has been upon using this plant to arrest certain forms of cancer. Species of *Senecio* known to have been used for some ritual or medical purpose in Mexico include: *S. grayanus*, *S. cervarifolius*, *S. praecox*, *S. tolucanus*, *S. hartwegii*, and *S. canicida*.

The use of the plant *Canavalia maritima* by sailors around the Gulf of Mexico was reported by Jose Diaz (Fig. 55). This legume is reported to be a substitute for marihuana as a recreational drug for which there appear to be no antecedent uses that can be documented. *Canavalia* seeds have been found in Oaxaca and the Yucatan dating from 300 B.C. to A.D. 900, and in Peruvian burial sites. In contemporaneous use it has been reported to be useful against the evil eye. When employed as a narcotic, it is not the seeds that are used, but the fruit or pod that is dried and then ground into a material that is suitable for smoking. As a comestible the beans are



FIG. 55:
Canavalia maritima

inferior to *Phaseolus*, and given the ancient cultivation of both, it is not unreasonable to suppose that the cultivation of *Canavalia maritima* may have been for reasons of its efficacy as a psychoactive material. Analyses show the presence of l-betonicine, an alkaloid also found in the genus *Achillea* and in two genera of the mint family, *Stachys* and *Betonia*. It would seem that this alkaloid is working in tandem with others, as it has not been demonstrated that betonicine is in itself psychotropic. Its popularity as a recreational drug merits further investigation of not only the chemistry but also the possible antiquity of use. Was it a comestible or a psychotomimetic? Perhaps it served dual purposes. We know that *Canavalia ensiformis*, the jack bean, is used when immature in the West Indies where the unripe pod is consumed. The seeds of this same pod are toxic when immature and when mature may be roasted and used as a coffee substitute. *Canavalia polystachya*, used in China, India, Arabia, and Africa, is eaten in its entirety, that is, both

seed and pod, when unripe. The ripe seed of this species is poisonous. We have no similar record of using the seed or fruit of either of these other two species in a manner similar to that of *C. maritima* in Mexico, and a comprehensive survey of this fascinating legume in all of its uses remains to be accomplished.

SOUTH AMERICA

Since the voyage of that remarkable ethnobotanist Richard Spruce to the Amazon and Andes during the years 1849 to 1864, ethnobotanists have journeyed to the Amazon in order to study the plants and the people. Wallace's edited notes of Spruce appeared in two volumes under the imprint of the Macmillan Company in 1908 and are essential reading for anyone who would attempt to penetrate this area in an anthropological or ethnobotanical foray. A more eloquent ethnobotanical chronicle for this vast area has yet to appear.

Most investigators since the expedition of Spruce have found a few weeks to attempt to add to the information that this famous botanist presented. One notable exception is Professor Richard Evans Schultes, Director of the Botanical Museum of Harvard University. Schultes has spent seventeen years studying in the Amazon and has lived among its people for extended periods of time during which he has presented ethnobotanists with a flood of papers that have added much to our knowledge of psychoactive plants of the area and the context of their use, and he has given us new genera and species that were formerly unknown in a ritual context. The acculturation of aboriginal peoples is taking place at an ever-increasing rate, and the destruction of indigenous vegetation in the tropics is being lost to slash-burn techniques of agriculture. The valuable phytological lore that would have otherwise been lost, and the traditions that are as perishable have been recorded by Richard Schultes and a number of his students. The legacy of the intrepid botanist Richard Spruce has been passed on to his legitimate heir.

In his *Notes of a Botanist on the Amazon and Andes*, Spruce devotes chapter twenty-five to narcotics and stimulants. What is so laudable about the approach of this gentleman from Yorkshire is that instead of viewing with horror the practices so vastly different from anything that he had previously known, he records events with fascination. His drawings of people and places are quite accomplished. It must have shocked many of his readers to find Spruce in accord with the medicine of the Amazon: "the domestic medicine of the South American Indians is chiefly hygienic, as such medicine ought to be, it being of greater daily importance to preserve health than to cure disease." He further noted that if the physicians of these people were sometimes lacking in skill, their methods were still far less dangerous than the practices of Western medicine as portrayed by Lesage and Molière. The warm sympathies of this great man opened doors to him that were closed to the judgemental Portuguese missionaries, who saw the devil in every sacred act of these people.

Of all psychotropic plants in the Amazon, perhaps none is more interesting than the liana which Spruce found and described under the name *Banisteria caapi* (*Banisteriopsis caapi*) in 1853 (P1. 45). This he included under the heading "On

some remarkable Narcotics of the Amazon Valley and Orinoco" and remarked on his good fortune of not only being able to see this famous narcotic in use, but to record its botanical features. *Ayahuasca* or dead man's vine was the name given to the plant in Ecuador, *caapi* in Brazil and Venezuela, and *cadána* by the Tucáno Indians on the Vaupés. Spruce noted that the lower part of the stem of this woody vine was stripped away and beaten in a mortar with the roots of *Haemadictyon amazonicum* and water. After being sufficiently trituated, the brew was passed through a sieve into a bowl and enough water was added to it to make it potable (Fig. 56). The color at that point was brownish-green and the flavor quite bitter and disagreeable.

It was November of 1852 when Spruce found himself an honored guest at a Dabocurí, or Feast of Gifts, given in the village of Panuré in a house known as the turkey-buzzard's nest. He writes of his nocturnal arrival just as the lugubrious sound of the sacred trumpets began to boom heavily and the women, under penalty of death, scurried to hide. Some three hundred men assembled and dances commenced. Five or six times in intervals between the dances, young initiates would drink *caapi* from the gourd of the cupbearer.

The cupbearer . . . starts at a short run from the opposite end of the house with a small calabash containing about a teacupful of caapi in each hand, muttering "Mo-mo-mo-mo-mo" as he runs, and gradually sinking down until at last his chin nearly touches his knees, when he reaches out one of his cups to the man who stands ready to receive it, and when that is drunk off, then the other cup.

In two minutes or less after drinking it, its effects begin to be apparent. The Indian turns deadly pale, trembles in every limb, and horror is in his aspect. Suddenly contrary symptoms succeed; he bursts into a perspiration and seems possessed with reckless fury, seizes whatever arms are at hand, his murucu, bow and arrows, or cutlass, and rushes to the doorway, where he inflicts violent blows on the ground or the doorposts, calling out all the while, "Thus would I do to mine enemy (naming him by his name) were this he!" In about ten minutes the excitement has passed off, and the Indian grows calm, but perhaps exhausted. Were he at home in his hut, he would sleep off the remaining fumes, but now he must shake off his drowsiness by renewing the dance.

The character of Spruce was that of an abstemious man, and it was with no great pleasure that he was obliged to "dispatch" a cup of the "nauseous beverage" himself followed by a gourd full of Manihot root beer, which he took with "secret loathing." Were that not enough, he was then given a cigar two feet long and as full as his wrist, followed by a cup of palm wine. He retired to a hammock with a cup of coffee and "the strong inclination to vomit." One must admire his stamina and endurance given his naturally delicate nature, which he constantly overcame in his Amazon and Andean expedition. It is noteworthy that Spruce indicated seeing vines under cultivation at this time. Only a few years later the explorer Villavicencio, writing on the geography of Ecuador, encountered the Zaparo, Angatero, and Mazan of the



FIG. 56:
Bowl used for ayahuasca

Ecuadorian Amazon using a similar decoction in order to deliberate on matters of war and love, to learn the source of spells, to divine truth, and to see into the future. While the published report of Villavicencio predates that of Spruce, it lacks the astute observations of the latter. As a botanical explorer, Spruce made careful and useful notes as well as collecting specimens. When he later visited the Zaparo, he correctly identified the plant which to Villavicencio was only a vine of some unidentified sort. A plethora of similar vagaries appeared from subsequent explorers who could say little more than “*ayahuasca*, *caapi*, and *yajé* are brewed from a jungle vine.”

Banisteriopsis brews are known by a variety of names according to the area's dialects as well as by the nature of the brew; many admixtures have been recorded since the first note of *Haemadictyon amazonicum* (now properly recorded as



FIG. 57: *Psychotria viridis*

Prestonia amazonica). What was formerly believed to have been brewed from a single species, *B. caapi* is now known to be derived from three additional species: *B. inebrians*, *B. rusbyana*, and *B. quitensis*. *Ayahuasqueros*, or those who use this beverage, are to be found in the Amazon basin of Brazil, Bolivia, Colombia, Ecuador, and Peru, as well as in the Orinoco of Venezuela and the Pacific coast of Colombia.

In the northwest Amazon, *caapi* is used as a hallucinogenic snuff, and in Colombia and Venezuela the dried stem bark is chewed. Various known as *ayahuasca*, *caapi*, *yajé*, *pinde*, *natéma*, *oco-yajé*, and *dapa*, the brew usually includes at least one of the species of *Banisteriopsis*. Most of these species grow as giant lianas vining from the forest floor into the canopy of leaves some several hundred feet above. The panicles of pink flowers with exquisitely clawed petals are rarely seen even by those who have studied the plant and its uses.

The chemistry of *ayahuasca-caapi-yajé* etc. complex is very problematic for reason of the great number of additives. The active ingredients in the bark of *Banisteriopsis* indicated the following beta-carbolines which are effective hallucinogens: harmine, harmaline, and d-tetrahydroharmine. A notable exception is *B. rusbyana* which has in addition the potent N,N-dimethyltryptamine as well as other tryptamines, bufotenin, and a beta-carboline in its leaves. Schultes has reported that the Tukanos of the Rio Vaupés have six unidentified vines as additives. The Sinoa of Colombia add *Datura suaveolens*, another potent narcotic, to their drink. The Ingano of a neighboring area add *Alternanthera lehmannii* to their brew. The Kofán and Jívaro of Colombia and Ecuador include the hallucinogenic *Brunfelsia grandiflora*. *Malouetia tamaquarina* is an additive utilized by the Makuna of eastern Colombia. Schultes, who has provided us with these identifications, has stated that the Tukano of the Brazilian Rio Vaupés may possibly add a species of *Gnetum* to their drink. G. T. Prance in 1970 identified *Psychotria viridis* (Fig. 57) as an important additive containing dimethyltryptamine. The previous report of *P. psychotriafolia* was in error, but more recently *P. nitida*, which also contains DMT, has become a suspected ingredient. One of the reasons for the addition of tryptamine-containing plants as additives to the harmine and harmaline of the *Banisteriopsis* is that the latter serve as monoamine oxidase inhibitors, which enhance the action of tryptamines. This accounts for some brews being extremely powerful in their action.

The hallucinogenic effects of *ayahuasca* are probably the result of the composite activity of harmine and harmaline, which inhibit monoamine oxidase, leading to an accumulation of epinephrine and norepinephrine in the individual. Many and diverse accounts of the effects of harmine have been reported, ranging from euphoria, perception disturbance, restlessness, vivid imagery, etc. when admixtures containing tryptamines are added; as is usual in most preparations, there is a potentiating effect as a result of the monoamine oxidase inhibitors acting upon the tryptamines from *Banisteriopsis rusbyana* or *Psychotria viridis*. This more potent brew accounts for the repeated reports of soul flight, visionary experiences, supernatural contact, the appearance of transpersonal symbols and archetypes, and divinatory activities. The collective consciousness of initiates in a *Banisteriopsis* ceremony has a great deal to do with the history presented in myths, symbols, and art before the initiation; that is to say, the boy is predisposed by his elders toward an enactment of a sort of psychodrama appropriate to the occasion. This by no means negates the personal subjective elements that are beyond control. Several anthropologists working in this area have provided a succession of accounts and insights that go beyond the mere characterization of the plant and its chemistry.

In addition to the above-mentioned elements, there is one more that is worthy of greater attention than it has previously been given, namely the "sexual impressions" that the brew provides, to use the expression of Lewin. The use of the drug for aphrodisiacal effects was noted by Wiffen in 1915, Reinburg in 1921, and Dobkin de Rios in 1970 and 1972. Harmaline and harmalol have produced sexual responses in rats under laboratory conditions. Five milligrams of harmine alone produce measurable sexual activity and vaginal dilation in rats. The other two isomers contribute to the effect. The aphrodisiacal effects and the sexual responses are usually ignored or are dispatched to an obscure anthropological or medical journal where they are obliquely noted. The psychoerotic effects in the *ayahuasca* ceremonies that have traditionally involved only males and extensive flagellation are worth more careful documentation and attention. Is this in part the sort of psychodrama akin to that which Reay described in New Guinea? The only significant insights to date have come from Reichel-Dolmatoff's 1971 book, *Amazon-Cosmos: The Sexual and Religious Symbolism of the Tukano Indians*. He has systematically explored the sexual content of these visionary states.

Another unusual condition of *ayahuasca* intoxication is augmentation of vision resulting in brilliant ornamentation, unusually perceptive night vision, illusion of rapid size changes in people and objects, and a pervasive overcast of blues and violets. This depends, of course, on the composition of the brew. Excessive doses result in nightmarish visions that simulate a psychosis. Curiously, the *ayahuasquero* does not lose consciousness nor does he lose motor coordination. It has been demonstrated, to the astonishment of foreigners, that an Indian may run through a forest at night under the influence of the drug and not stumble or lose his footing. The vision is remarkably clear, perhaps augmented as *ayahuasqueros* insist, and the footing sure.

It is not only pleasurable states that may result from *ayahuasca*, but certain illnesses can be healed by those ordained to accomplish such feats. Illness has many faces and, in addition to the indisposition of the body as the result of fevers, wounds, etc., there is the condition of being bewitched or hexed by a brujo or malevolent person. In either case the *ayahuasca* healer is able to divine the illness and remove the causative agent in the mind of his patient. An elaborate documentation of this ceremony of healing as well as the use of *Banisteriopsis* in witchcraft was presented by Dobkin de Rios in 1970 after her work in a village in Iquitos, Peru.

Among the Makú in the northern Brazilian Amazon, another beverage is prepared under the name *caapi*, which may represent the *caapipinima* or painted caapi of the Rio Vaupés of Brazil. Various kinds of caapi have been reported; these may represent different species of *Tetrapteris* of the family Malpighiaceae to which *Banisteriopsis* also belongs. We know that *caapi* among the Makús is the attractive *T. methystica* (Pl. 46). This plant also is a liana whose flowers appear in brilliant yellow panicles in the canopy above the forest. Each individual flower is yellow tinged with red near the center. Bark is stripped from the plant and steeped in water until it becomes quite yellow. The infusion in cold water is drunk without adding any other plants. *Caapi* produced from this genus is very similar in content to that from *Banisteriopsis*, as attested to by Schultes, who in 1948 participated in the

ritual use of this drink among the Makú on the Rio Tikié and gave the specific name to this plant. It is believed that beta-carbolines, such as harmine and its isomers, are the active intoxicants.

Brunfelsia species have been admixtures to *caapi*, but have also been used to prepare a hallucinogenic drink apart from additives, according to reports from the French botanist Benoist. This solanaceous shrub was apparently used in the western Amazon for a considerable time, and is now used by the Kachinauas of the Brazilian Amazon to prepare a hallucinogenic philtre. *Brunfelsia tastevinii*, named after the missionary R. P. Tastevin, is utilized by these people under the name *keya-honé*. This preparation, they believe, allows them to fight all sorts of maladies. Juice expressed from the plant, when drunk, takes effect in about fifteen minutes and renders the participant speechless. According to Tastevin, "the magical properties" then become apparent and the victim of the drug sees visions of dragons, tigers, and the like, which seek to devour him. The action lasts for four or five hours depending upon the amount he has consumed. In its natural habitat the plant grows as a vine, probably due to the low light intensity of the forest floor, but when cultivated it forms a bush, seldom branching in excess of two meters. The tubular, greenish-yellow flowers terminate the branches in abbreviated pedicellate cymes.

Brunfelsia species are also known in the Colombian Putamayo as the shrub that intoxicates, and in Brazilian medicine *B. uniflora* is important in folk medicine to treat fevers, snakebite, rheumatism, etc. Work done in the Colombian Amazon by Plowman suggests that the plant used in this region is *B. grandiflora* (Pl. 47). Some of the earlier descriptions may be based upon the misidentification of this highly variable species that is widely distributed in forested regions throughout much of South America.

Earlier identifications of alkaloids under the names franciscaine, manacine, and brunfelsine seem to be insufficient characterizations, as does the coumarin, scopoletin. The action of the leaves and bark in an infusion suggests the presence of tropane-like alkaloids, but these remain to be determined.

Snuffs derived from a large number of plant species figure prominently in the ethnobotanical lore of much of South America. The practices of snuffing and the great diversity of appointments to these practices were very well documented by Wasson in 1965 in his fine monograph on this subject. Containers made of large snail shells are often used to carry snuff, and the snuffing tubes are usually made of hollow plant stems or the hollowed bones of certain birds' legs. The wide variety of forms of these tubes allows self-administration of a narcotic snuff or permits it to be blown into the nostrils of a friend (Fig. 58). These practices are rapidly disappearing through acculturation, and it is largely the astute observations of early explorers that have given us information on the practices. The precise identification of some of the botanical sources of these snuffs remained to be identified until relatively recently.

The shamanic context of use is well established and is manifest in some of the figuring on the snuffing apparatus as well as their forms. An intimate association with birds is characteristic of many snuffing practices. The snuffing tubes of tribes of the right bank of the Rio Guaporé terminate in various bird heads, and clay

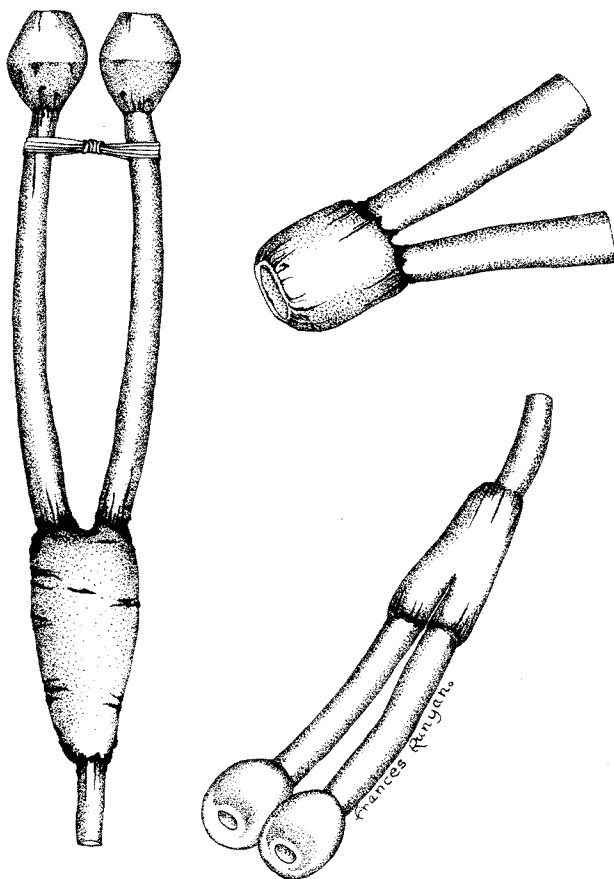


FIG. 58:
Snuffing tubes

snuffing pottery from as far north as Costa Rica reveals the form of birds that is associated with soul flight. The keen sight of the eagle makes it a sacred bird in the mythology of many of these people, and the vulture, for the presumed reason of its high flight and its ability to remain seemingly suspended in air, is also sacred. I believe that we must not neglect the role of the vulture as a scavenger in eating the dead. The role of endocannibalism among some tribes and the relationship of this practice to the birds that are represented in their myths deserve more attention. This is obliquely found in the account of Goldman, who in 1963 published a résumé of the mourning practices of the Cubeo in which the vulture is the patron of ecstatic intoxication and presides over the ceremony. It is almost a dictum that in true shamanism there is invariably the bird spirit represented, whether it be the raven of the Eskimos, the gulls of the northwest United States coast, the *mut* (vulture) of the Egyptian shaman-priest, the eagle of the American Indians, the crested harpy eagle and vulture in South America, the plover in Samoa and related cultures, etc. An

anthropologist might logically extend this to the dove as the Holy Ghost in Christian tradition. Spirit flight requires such a manifestation.

The most widespread snuffing practice involves the genus *Anadenanthera*, which was formerly included in the *Niopa* section of the genus *Piptadenia*, under which designation early studies are to be found (Fig. 59). The scholarly work of Siri von Reis Altschul published in 1972 clarified many formerly obscure aspects of the genus with respect to the correct botanical designation, patterns of distribution, cultural treatment, cross-cultural contexts, and phytochemistry. It stands as a model for the approach that is desperately needed for many other genera. This monograph, the culmination of seventeen years of investigation, does not lend itself to condensation. The snuffs known as *yopo*, *vilca*, and *cohoba* belong to *Anadenanthera peregrina* (varieties *peregrina* and *flacata*) and *Anadenanthera colubrina* (varieties *cebil* and *colubrina*). Von Altschul does a great service for the scientist by



FIG. 59:
Anadenanthera peregrina

distinguishing between the botanical sources for snuffs that were often confused with several other genera and species in diverse families.

Von Humboldt and Spruce both encountered and wrote of the snuff that is derived from *Anadenanthera* (thought to be a *Mimosa* or *Acacia* by some explorers). The account of von Humboldt under the notation of *niopo* was laconic, but Richard Spruce wrote a fairly lengthy and stylish account of his experiences with the seed of this legume. While he had gathered specimens of the tree in 1850, it was not until four years later, at the cataracts of the Orinoco, that he encountered a wandering group of Guahibos encamped on the savannas of the Maypures making *niopo* snuff. Spruce watched an old man roast seeds of the tree and powder them on a platter using a wooden spatula and then neatly pour the stuff into a container made from the leg bone of a jaguar. He was intrigued by the process and purchased the apparatus for the Museum at Kew Gardens. He described a Y-shaped snuffing tube and records the reaction of the Indians as being without hunger or thirst; "One feels so good," Spruce says, recording a Guahibo, "No hunger, no thirst, no tired!" It should be noted that the informant sniffed from a box of *niopo* through this tube and then chewed the bark of *Banisteriopsis*, accounting in part for the total effects. He also recorded the use of *niopo* in a clyster, which is sometimes a violent purge. After noting that the various tribes of the upper tributaries of the Orinoco all use *niopo*, he then makes a most unusual comparison between the intoxication resulting from *niopo* and that from the fly agaric, *Amanita muscaria*. The Catauixi were observed to use *niopo* before a hunt to make them more alert and clear their vision. They also administered the snuff to their dogs!

Herndon gave an account of the use of a snuff known as *paricá* among the Mundrucús of the river Tapajoz. This he derived from a French trader by the name of Maugin. The name *paricá* is here understood to be *Anadenanthera*, but the name is more often applied to resins derived from trees of the genus *Virola*. The Mundrucús powdered the seeds taken from the long pods and made them into a paste, which was dried and then pulverized once more. Their snuffing tubes were made of two heron quills (the inescapable bird imagery), which were joined side by side to make a double tube that could be inserted into the nostrils and then into a box of the narcotic snuff. Maugin stated that after a single strong inspiration (commenting on observing an Indian male), "His eyes started from his head, his mouth contracted, his limbs trembled. It was fearful to see him. He was obliged to sit down or he would have fallen. He was drunk, but only for about five minutes; he was then gayer."

Anadenanthera snuff was first reported among the Taino Indians of Hispaniola, who used it under the name *cohoba*. An authoritative identification might seem difficult when the aboriginal people of Hispaniola are all but extinct. Fortunately, Fra. Ramon Paul, a monk traveling with Columbus, had the good sense to record ethnological curiosities such as *cohoba* sniffing. Early records characterize the intoxication as stupefying in the extreme so that the participant may lose consciousness and his arms and head hang from his body. The visions are reported to include seeing the world inverted. There is little doubt that this snuff was first used by payés, or witch doctors, for ritual divination. Spruce states that he never had the good fortune to witness a genuine payé at work. His reason was that the civil

authorities persecuted these practitioners, and their offices had been taken over by the Christian padre. Since the ceremonies were not recorded in any detail in either the West Indies or the Amazon at an early date, we must take contemporaneous accounts as descriptions of practices that are probably much modified with respect to ritual.

Preparation and use of the snuff produced from *Anadenanthera* varies from area to area and between tribes. When von Humboldt was among the Maypure Indians of Orinoco in 1801 he observed the pods of the *Anadenanthera* (which he identified as *Acacia niopo*) to be broken open, moistened, and allowed to ferment. When these turned black and were soft, the seeds were removed and mixed with cassava meal and lime derived from snail shells. The cakes were dried and later provided a supply of snuff whenever it was desired. Von Humboldt felt that it was the lime from the snail rather than the *niopo* that produced the narcotic effect. He did not pursue the investigation. Not all groups add lime to their *niopo* preparations, and it is not necessary for the physiological action. The *vilca* and *huilca* in southern Peru and Bolivia, and *cébil* in northern Argentina are also derived from *Anadenanthera*, probably *A. colubrina*. Schultes reports on uses among the Inca observed in 1571, stating that the witch doctors prophesied by becoming intoxicated with *chica* (a beer) and an herb called *villca*, which they drank together.

All species and subspecies of *Anadenanthera* that have been investigated chemically contain a series of substituted beta-phenethylamines in their seeds including N,N-dimethyltryptamine and bufotenine (5-OH-DMT), which is closely related to serotonin. The activity of bufotenine is in dispute. Other tryptamines reported from this genus include: DMT, MMT, 5-MeO-DMT, and 5-MeO-MMT. The beta-carbolines are: 6-MeO-THC and 6-MeO-DMTHC. These chemical combinations are the same as those found in the related snuffs derived from *Virola* species. The snuffs have often been used under the same names, leading to a great deal of confusion in early literature.

Virola

The genus *Virola* is comprised of about fifty tree species found in the forests of Central and South America. Although in the same family as the nutmeg, their properties and uses are remote from those of *Myristica*. It was not until 1909 that the anthropologist Koch-Grünberg presented an account of the preparation and uses of a snuff, *hakudufha*, that was in use among the Yekwana Indians in the headwaters of the Orinoco River. Koch-Grünberg considered the snuff prepared from *Virola* to be a part of the ritual magic of the Yekwana. Unaware of the botanical source of the snuff, he referred to it merely as the bark of a certain tree which when pulverized and boiled to a sediment could provide a hard block of material that could be pulverized into a snuff. *Hakudufha* was blown into the air by the sorcerer and then snuffed by a reed into each nostril resulting in singing, screaming, and a convulsive movement of his body to and fro.

Not until the 1938 report of Ducke, a botanist, was it clear that in the upper Rio Negro *Virola cuspidata* and *Virola theiodora* were being used to make a snuff called



FIG. 60:
Virola calophylla

paricá. This was the same name used for snuffs prepared from *Anadenanthera*, which has led to much confusion. The greatest clarification came from Richard Schultes, who published his findings on the use of *yakee* among the Puinave and *yato* among the Kuripako in the northwest Amazon in 1954. The brown snuff of Indians in Amazonian Colombia that is used for magic, prophecy, and divination was established as *Virola calophylla*, *V. calophylloidea*, and possibly *V. elongata* (Fig. 60). Indians in this area of the Amazon strip the bark from the trees in early morning and scrape off the inner soft, red cortex that is filled with resinous exudates. These particles are kneaded in water, removed, and the water boiled to a viscous mass which is subsequently dried in the sun. The dried concretion is powdered and mixed with the ash taken from *Theobroma subincanum* to provide a snuff so potent that it has been known to cause deaths among the shamans of the region.

Among the numerous Indians inhabiting the headwaters of the Orinoco in Venezuela and the Brazilian Rio Negro, *Virola* snuffs are prevalent and are known as

epená, *ebene*, and *nyakwana*. These people who are grouped into the Waiká (Guaiká) use *epená* hedonistically as well as ritually. It is often used by the male Waiká over the age of thirteen even though it is possibly the strongest of the snuffs from *Virola*. Any of five species in the area might provide the necessary resins, but the species most commonly found in use is *V. theiodora*. Preparations are diverse, but the most common mode of use is to scrape the inner bark and roast the shavings over a slow fire. In this manner they may be preserved for later use. When desired, the brittle scrapings will be pounded in a mortar made from the fruit coat of the Brazil nut and to this will be added bark ash from the tree *Elizabetha princeps* (*amá* or *amasita*) and the powdered leaves of a pungent-smelling herb, *Justicia pectoralis* variety *stenophylla* (Fig. 61). Although little is known of the effects of the *amá*, we know that this *Justicia* has been called *bolek-hena*, or "leaves of the Angel of Death" for reason of its potency as a snuff. At least three shamans have been



FIG. 61:
Justicia pectoralis
v. *stenophylla*

reported to have died from using this snuff from the small violet-flowered acanth. While the Waiká have declared the reason for use to be to enhance the fragrance of *epená*, they are certainly aware of the added potency that has thus far been attributed to N,N-DMT.

Ceremonial *epená* is made by stripping the bark from *Virola theiodora* and placing it near a fire, which will cause the bark to exude the translucent red resins. These are gathered and reduced over heat to a crystalline mass that is ground and used most often without an admixture. The ceremonies may involve endocannibalism as a mode of communing with the departed. The syndrome of effects is an initial period of several minutes of frenzy, subsequent numbness of the limbs and loss of motor coordination combined with twitching of muscles. Nausea may develop, but when it does, the effects of the hallucinogens are already at work. Visual hallucinations are then experienced, and among the Waiká these include macroscopia, or things seen in giant forms. This is frequent among these people, and they will often give over to vocal outbursts during the period of visions. This would seem culturally conditioned, for it is inseparable from the concepts of *hikura*, the spirit who dwells in the *Virola* tree. This is a notion common also to the Bwiti of equatorial Africa, who find spirits resident in the *Alchornea floribunda* tree. Further evidence for this as a conditioned response is the evidence from the Witotos, Bora, and the Muinane tribes in Amazonian Colombia, who use the same species as an oral hallucinogen, rolling the boiled resin with the ash of *Gustavia poeppigiana*. Three to six pellets the size of coffee beans induce a hallucinatory experience of several hours in which "little people" are seen and clarification of problems comes. The contrasting visions, one small, the other large, must be explained on the basis of either cultural conditioning or the effects due to the admixtures. *Virola* research in the future will probably be directed toward investigating the practices among certain Venezuelan Indians, in which *Virola sebifera* is reportedly smoked in ritual dances and for curing fevers. The greatest body of data to date derives from the extensive research of Richard Schultes throughout much of the Amazon in his seventeen years of study there. It was this scientist who also pointed out the practice among the Makú of Amazonian Colombia of drinking the unprepared resins of *Virola elongata*.

Seitz in 1965 reported in an appendix to Wassén's monograph of that year on his work among the Waica (Waiká) and came to the conclusion that there was no system in the snuffing ceremony and that he did not find these people to be witch doctors or medicine men. This observation, based upon two visits to the Amazon, in no way invalidates the more extensive and intensive research of Schultes, who has given us a comprehensive survey based on extended periods of living with these people.

The four tryptamines and two beta-carbolines present in *Anadenanthera* are all to be found in the various species of *Virola* distributed among the bark, roots, leaves, flowers, and shoots. The greatest concentration of DMT is consistently in the leaves of the species and ranges between ninety-three and ninety-six per cent. It is postulated that the tryptamines are the active psychotomimetic while the beta-carbolines serve as monoamine oxidase inhibitors. It is interesting to note that

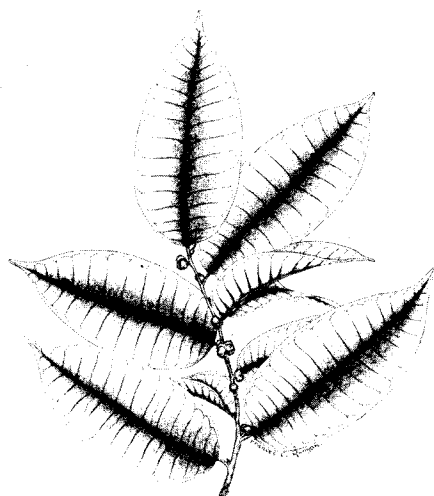


FIG. 62: *Olmedioperebea sclerophylla*



FIG. 63: *Mimosa hostilis*

DMT is not active when taken orally. This accounts for the popularity of snuffing, a practice whose origins are not only obscure, but baffling.

Several snuffs used in South America remain obscure with respect to botanical origins, preparation, and use. One that is known to have been used in the central part of the Brazilian Amazon, especially along the upper Xingú, is *Maquira sclerophylla* (*Olmedioperebea sclerophylla*) (Fig. 62). This giant tree belongs to the fig family and produces fruits that have presumably been made into a snuff in times past in the Pariana region, where it is known as *rapé dos indios*, a Portuguese term that means Indian snuff. Schultes believes that the use of this snuff has died out, but that formerly it was employed in rituals and dances. An analysis of these fruits has yielded no information with respect to a narcotic property, and there is no information as to how the fruit might be prepared as a snuff.

Mimosa hostilis is a legume that is closely related to *Acacia* (Fig. 63). This thorny shrub is important to the jurema cult, which consisted of numerous tribes that have now been acculturated for the most part and no longer participate in the miraculous drink from this plant, which is called *ajuca* or *vinho de jurema*. In the states of Pernambuco and Paraíba, it was used by the Karirí, Tusha, Fulnio and Pankarurú. Other tribes using it were the Acroa, Guegue, Atanayé and Pimenteria. There is no doubt that it was of widespread importance in eastern Brazil, but as with other hallucinogens, its use seems to have all but disappeared and, were it not for reports from 1788 and 1843, we would know nothing of the plant or its use. The 1946 reports of Lowie indicate that this drink was prepared from the roots of the shrub and given to priests and warriors. In the ceremony involving kneeling and a reverently bowed head, the priest administered a cup of the root decoction to the

young warrior while old women sang songs of the jurema ritual. After receiving the draught from the old shaman-priest who carried a feathered rattle, the youths would see a magical land filled with birds and flowers and the crashing rocks that destroy the souls of the dead: the realm where the exquisite Thunderbird propels lightning from the crest of his head and runs about producing thunder. *Jurema branca* may refer to the preparation from either *Mimosa hostilis* or *M. verrucosa*. In the utilization of the latter species the bark is stripped from the shrub known as *caatinga*. Nigerine, formerly believed to be the active ingredient of the jurema, has now been identified as N,N-dimethyltryptamine.

ANDEAN HIGHLANDS AND ADJACENT AREAS

Most important among the hallucinogenic plants of the Andean highlands is the genus *Datura* represented here by its most unusual members. All belong to the subgenus *Brugmansia* and are arborescent, bearing trumpets of white or sanguine flowers hanging in abundance among the branches. Only *D. suaveolens* grows in the warmer lowlands; the rest (*D. aurea*, *D. candida*, *D. dolichocarpa*, *D. vulcanicola*, and *D. sanguinea*) are indigenous to the cooler highlands. The *Daturas* of the Andes differ from their relatives in North America and Central America in both morphology and the usual modes of use. Most often, the seed is powdered or ground into a meal and put into beverages of various sorts. The result is a narcosis so violent that the participant often has to be physically restrained to protect himself from others. Eventually he will be overtaken by an extended sleep with waking fits of hallucinations and colorful visions that are understood to be communication with the spirit world and souls of the departed. The intent is to become prophetic through divination. These visions are induced by the tropane alkaloids, hyoscyamine, nor-hyoscyamine, and scopolamine. Each species varies with respect to the concentrations of these alkaloids, but they are all in abundance in most parts of the plants. Tree *Daturas* are imperfectly known to botanists because of the large number of cultigens and hybrids as well as those plants that have been deliberately changed through viral infections. The Kamsá and Ingano tribes in the southern Colombian highlands have created monstrous varieties through the perpetuation of viral infection. They have long believed that these plants are superior to any others, and the practice is copied in the Ecuadorian highlands. It would seem that most of the tree *Daturas* and their varieties, to include these bizarre atrophied forms, are the result of man's historical cultivation and selection.

It was an ancient practice among the Chibcha of Colombia to administer *Datura aurea* (possibly *D. candida*, *D. suaveolens*, or *D. sanguinea* as well) in a corn beer (*chicha*) to the wives and slaves of a departed husband or master, and in the state of stupor that followed, they were buried alive with the deceased (Fig. 64). Sogamoza, north of what is now Bogotá, contained the Temple of the Sun, and it was

FIG. 64: *Datura suaveolens*



here that the beverage *tonga* was made to be used in ceremonial ritual. It was prepared from *D. sanguinea* and was far more potent than that prepared from the other tree *Daturas*. It is this same plant that is known as *huacacachu* or grave plant in Peru, where it is believed that the narcosis from *D. sanguinea* will reveal, in a trance state, the site of ancient graves that contain treasures.

Among Ecuadorian Jibaro, children who misbehave are given *Datura* seed preparations so that their ancestors might visit them and admonish them. An earlier practice, now extinct, was for a nursing mother to smear her paps with crushed *Datura* to cause an unwanted child to die. This practice suggests the old English use of wormwood to wean a child away from his mother or nurse.

At one time a male who was coming of age in the western Amazon was obliged to take a draught of *maikoa*, or *Datura* infusion, from each male elder in his tribe. Obviously a boy could not take any considerable amount of the brew orally, so after a time the elders inserted a hollow bone or horn into the rectum of the lad and with a pouch of *maikoa* attached, they were able to administer anal doses until a deep comatose state set in. The purpose of this ritual enema was the same as that among North American Indians. The child was to forget the things that pertained to his youth and be advised in this trance by his ancestors of things that related to the proper life-style for a man.

Much lore concerning the tree *Daturas* has been uncovered, but there is a great deal yet to be learned about contemporaneous practices and those practices that have been lost but yet remembered. If we accept this as the center of origin for this section of the genus, then its widespread contemporary distribution that parallels the habitations of man in much of South America is to be explained on the basis of selection, cultivation, and even hybridization by man to produce desirable strains.

In 1955 Richard Evans Schultes described a large tree that had the characteristics of some of the *Daturas*, but was quite extraordinary and different in many of its features. Only in the Valley of Sibundoy in the southern range of the Andes of Colombia is this bizarre production to be found. In the Kamsá language of the region it is called *mitskway borrachera*; another name for it is *culebra borrachera* (literally drunken snake, possibly a reference to the effects as well as to the twisted elongate leaves). *Methysticodendron amesianum* is thought by some to be a cultivar or aberrant form of *D. candida*, but the collective features, including the leaves, the white flower that is up to a foot-and-a-half in length, and the gigas form argue against this (Pl. 48). The characterization by Schultes in 1955 still seems to be more taxonomically acceptable than other theses that suggest viral infections of a *Datura*, the pleiotropic effect of a single gene, or the cultivar hypothesis. The tree is clearly a departure from the genus *Datura* deserving of the generic disposition given by Schultes. The natives who propagate the plant asexually (the most common mode of propagation with most tree *Daturas*) regard it as more potent than *Datura* and use it in instances where extraordinarily difficult divination must be accomplished. The chemical analysis showing the leaves and stems to contain eighty per cent scopolamine in the total assay of alkaloids indicates its potency, which is manifest in excitement, delirium, hallucinations, and coma.

Throughout the central Andes one frequently finds the cactus *Trichocereus*



FIG. 65:
Trichocereus pachanoi

pachanoi in cultivation under the name "San Pedro" (Fig. 65). The form of this plant is much like that of *Cereus*, growing to twenty feet in height and comprised of fleshy six- to eight-ribbed branches with few spines. When the latter are present, they are in groups of three to seven. At night the enormous flowers appear at the tip of the branches exuding fragrance from the pale buff outer petals and the reddish inner ones. Although the plant is not closely related to *Lophophora* (peyote), it contains mescaline in the flesh. Throughout eastern Ecuador and Peru the plant is widely cultivated and used to make a hallucinogenic brew called *cimora*. The cactus is stripped of any spines and cut into pieces that are placed into a cauldron with *Neoraimondia macrostibas*, *Iresine*, *Isotoma longiflora*, *Pedilanthus tithymaloides*, and one of the *Daturas*. Water is added to the mixture, and it is allowed to cook for several hours until it has the consistency of pea soup. The brujo or curandero who administers a cup of the brew to his client expects vomiting to follow, and then a period of revelation in which questions may be asked of the intoxicated person or he may be asked to choose among a series of objects, each of which has an individual and collective meaning to the brujo. It may be used in order to take possession of the soul of another. In some instances, it is the brujo or bruja



FIG. 66:
Lobelia tupa

who ingests the liquid in order to divine or become prophetic. The antiquity of this ritual use was indicated by Douglas Sharon, who in 1972 wrote of the use of this plant (San Pedro) among folk healers in coastal Peru. Douglas Sharon found images on funeral pottery and painted textiles of Chávin, an Andean civilization dating to 1000 B.C. It reappears later in the ritual art of the Moche and Nazca cultures.

Since mescaline is two per cent of the composition of San Pedro as measured by dry weight, we may expect the effects to be similar to those of peyote unless the admixtures are present that may alter the visions. Dobkin de Rios in 1972 documented a healing ceremony in Peru in which both the folk healer and patient drink a San Pedro brew in order to divine an unknown illness. It would seem that the plant has not been used as a personal inducement to religious contemplation, nor is there evidence for a hedonistic use in Peru or Ecuador. Since the fast-growing cactus has a hardy root system, it is often used throughout the southwestern United States for grafting purposes, in which instances more tender cacti are grown on this

plant. A widespread knowledge of the properties of the plant and its current legal status have made it a plant of considerable importance in the United States drug subculture. It is widely available in most cactus nurseries, where it is often sold as an ornamental.

Another plant in wide employ among the Kamsás and Inganos of the Sibundoy, a valley existing at an elevation of 6,700 feet, is *Iochroma fuchsoides* (*I. umbrosa*) (Pl. 49). Schultes, who has studied this plant in some detail in its habitat, refers to it as a magico-religious narcotic. Formerly the status of use among the people of southern Colombia with respect to this plant was in question. The early studies of Schultes in 1946 had implicated the plant, and later it seemed not to be verified by subsequent investigators. Returning in 1974 Schultes in extensive discourse with a leading Kamsá medicine man found that *Iochroma fuchsoides* leaves were used for difficult diagnoses, divination, and prophecy. The medicine man employing the leaves is often ill for a day or more following his use of the material. Fresh bark and leaves are boiled together and cooled. One to three cupfuls taken over a three-hour period induce hallucinations. It was reported that the plant used to be employed more frequently in earlier days. Known by a variety of popular names such as *borrachera* (intoxicant), the plant is grown by Kamsá medicine men along with *Datura candida* and *Methysticodendron*, indicating something of its status. In chemical analyses thus far, it has not been possible to isolate a known hallucinogen from this red flowered shrub, but it seems that tropane-like alkaloids might be present due to its botanical affinities.

The family Campanulaceae is so large that it has been divided into three subfamilies of which Lobelioideae is one. The distinctions found within this taxon have brought some taxonomists to the view that it should be treated as the family Lobeliaceae. *Tupa* or *tobaco del diablo* is derived from *Lobelia tupa* of the Chilean highlands (Fig. 66). The plant is in no way related to the tobacco of commerce. The tall and highly variable herb has found a place in folk medicine, as the leaves may be pressed to exude a juice reported to be useful in curing toothache. More interesting is the practice among the Mapuche Indians of smoking the leaves for their intoxicating effects that may extend into the realm of hallucinations. We must recall the use of *Lobelia inflata* in North America among the Penobscot Indians of the eastern states. When in 1785 Cutler published his account of this herb and its uses, he noted that the leaves when chewed "produce giddiness and pain of the head, with a trembling agitation." This was the plant that he called "Indian tobacco." While these properties were later ascribed to lobeline, which is also found in *Lobelia tupa*, there may be other yet undiscovered chemicals contributing to the syndrome. In *L. tupa* lobeline, lobelamidine and norlobelamidine have all been reported to be present. Although no one of these may be considered as a hallucinogen, the effect on the Mapuches is much like that reported for the Penobscots. This same family provides *Isotoma longiflora*, an ingredient in *cimora* of the Peruvian Andes and a plant for which we have no satisfactory assay.

In the southern parts of Chile the hillsides support a shrub growing to about three feet in height and known to the natives as *taique* or *chapico*. The botanist recognizes this plant as *Desfontainea spinosa*, based upon its tubular flowers that

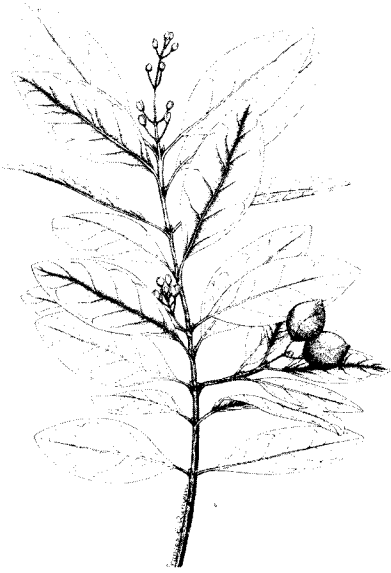


FIG. 67: *Gomortega keule*

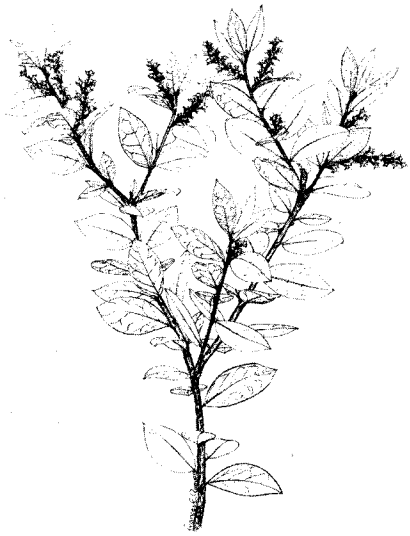


FIG. 68: *Pernettya furens*

are bright red tipped with yellow and its holly-like leaves (Pl. 50). *Desfontainea* is the only genus in that family, Desfontainiaceae (formerly included in the Loganiaceae or Potaliaceae), and the variety known as *Hookeri* is that employed as a narcotic. Although it has been known for some time that the leaves of this plant have been used as both a medicant and a narcotic, chemical analyses remain to be carried out.

The Chilean Mapuche Indians also utilize the fresh fruit of the tropical endemic tree *Gomortega keule* of the family Gomortegaceae (Fig. 67). This primitive tree is related to the families Atherospermataceae and Lauraceae and is considered to be primitive among flowering plants. The entire distribution pattern for the tree is within the area of only one hundred square miles. Known as *keule* and *hualhual*, the tree may be found on forested slopes and is easily identified by the shiny evergreen leaves and the small fleshy plum-like fruits that are fragrant and rich in essential oils. It is the fruit oils that are intoxicating, and fresh fruit seems to be more potent than dried. It has been suggested that physiological ammoniation of these oils in the human body may produce an amphetamine-like hallucination, but concrete evidence for this is lacking.

Pernettya furens belongs to the heath family and is common to Chile and surrounding areas (Fig. 68). The fruits are called *huedhued* or *hierba loca*, since eating them causes mental confusion, delirium, and in excess is said to provoke a permanent mental condition that mimics insanity. Some have compared the intoxication to that produced by *Datura*. A related species in Ecuador, *P. parvifolia*, known as *taglli*, is known to cause hallucinations and lack of motor coordination.

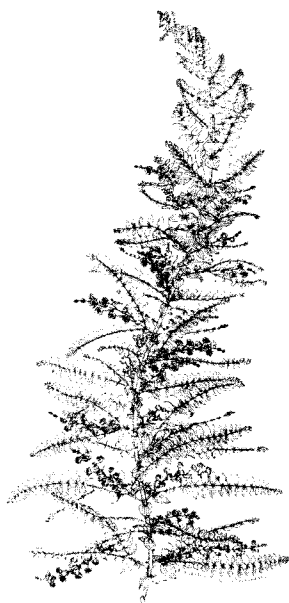
There is some debate over whether this intoxication is deliberate or accidental, but recently Naranjo has argued for purposeful intoxication. *Pernettya parvifolia* contains andromedotoxin and arbutin, a resin and glucoside respectively. Neither of these may be considered hallucinogenic, but the behavior of the individual who has consumed fruits of these species exhibits every characteristic of one who has experienced a powerful hallucinogen.

In the montane areas of central Chile one infrequently encounters the shrub or small tree *Latua pubiflora*, which was first described in 1888 and also known under the name *L. venemosa* for reason of the venomous nature of the leaves, which contain hyoscyamine and scopolamine (Fig. 69). It is interesting that the natives insist that the fruits also intoxicate, for an analysis of some of the dried fruits revealed no hallucinogens or related compounds. Perhaps fresh fruit might provide different information. In the province of Valdivia, the plant has been known as *latué* and *arbol de los brujos* (tree of the warlocks or sorcerers), for like *Pernettya* it may induce a permanent madness. Those who inhabit this area believe that an accomplished sorcerer can provide a madness of predictable duration according to dosage. Both the preparation and dosages remain carefully guarded secrets in the hands of these malefactors. No cult use apart from the activities of brujos surrounds the plant, and it is generally regarded with fear and suspicion. Given the chemical composition, the hallucination should be much like that from *Datura* or *Hyoscyamus*. It is found only in moist shaded areas, sometimes advancing into meadows at altitudes of about 1,500 feet.

FIG. 69: *Latua pubiflora*



FIG. 70: *Coriaria thymifolia*



Coriaria thymifolia is found throughout the Ecuadorian Andes as a shrub that is toxic to browsing animals (Fig. 70). It is the only genus in the family Coriariaceae, which is related to the family Sapindaceae. Frond-like leaves of a pinnatifid nature grace the branches, and lateral spikes of tiny flowers are displaced by clusters of small purplish fruits. These fruits when ingested provide sensations of flying. This is thought to be due to catecholic derivatives or an unidentified glucoside. The plant is called *shanshi*, and its use is restricted to sorcerers who indulge in magical flight.

EUROPE AND THE MIDDLE EAST

For all of the herb lore of Europe a few centuries ago, little survives today, and an enumeration of hallucinogenic plants in this area seems comparatively depauperate. I believe that the best explanation for this comes from the famous anthropologist Weston LaBarre of Duke University, who pointed out that the Eurasiatic shamanistic tradition persisted in Western culture in the shamanistic metamorphoses of Zeus, the weather-shaman Hera, the shamanistic trident shared by the brothers Zeus and Poseidon, the animal alter egos of the gods (Apollo—wolf; Zeus—serpent, thunderbird; Artemis—stag; Athena—owl, snake; Dionysus—bull; etc.). Even the gods had their oracles: Zeus at Olympus and Apollo at Delphi. Did the Delphic Oracle have hallucinogens in the censer while she reposed on her three-legged stool? By what magic did Circe change men into swine? What was the odorous ambrosia of the gods? How does one explain the potency of the seed cake of Ceres? In one brilliantly laconic statement, LaBarre answers many of these questions: "And when the anthropomorphic God dies, we have left the impersonal forces of science." As Harner pointed out in 1973, the additional factor of the Church considering shamanic practices and the utilization of hallucinogens to be heretic led to the abolition of such practices, obscuring much of the Western tradition. Thus the traditions of shamanic witchcraft are regarded by some scholars as a fiction created by the Church, especially during the Inquisition. We must remember that early Western civilization had its roots in a strong Eurasian shamanistic background, and this remains reflected in our mythology. Displacement of these traditions has left only hints of ritualistic practices, which were doubtless as varied and bizarre as those found among aboriginal peoples of today. By culling mythology, witchcraft, and folk medicine traditions from European lore, we may find an even greater number of psychoactive plants that have been employed in the Old World as compared to the New World traditions.

Instead of centering our attention solely on aboriginal cultures and the remnants of defunct New World cultures, perhaps we need to relearn the roots of our own shamanistic traditions and find the specific plants that were associated with that which is now taken to be myth and legend. A reinvestigation of the mystical Old World and its supernatural traditions is sorely needed.

Syrian rue is a name used to describe a woody perennial shrub found growing in dry areas of the Mediterranean, in northern India, Mongolia, and Manchuria. Known to botanists as *Peganum harmala* of the family Zygophyllaceae, it is famous for its use in producing the dye called "Turkish red," which is obtained from the abundant

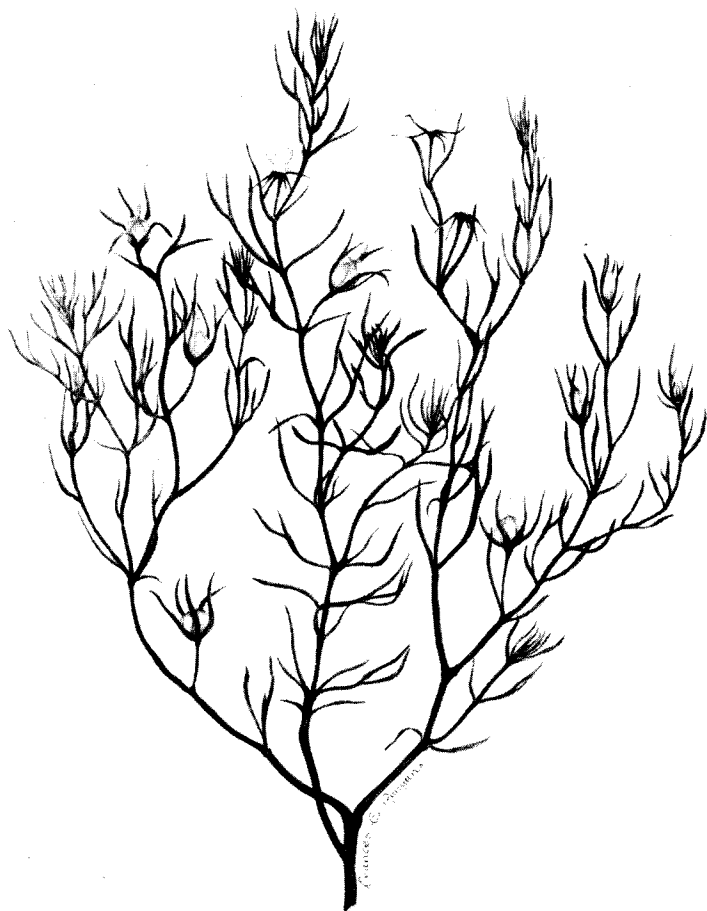


FIG. 71:
Peganum harmala

seed (Fig. 71). It is used to produce color characteristic of all of the Iranian and Turkish carpets. Dioscorides spoke of this plant in his famous codex (*Codex Vindobonensis*) of the first century. The written history of this plant extends over a thousand years. In Egypt the oil from this seed is sold as *zit-el-harmel* and has the reputation of being an aphrodisiac. Medicinal uses extend to its use in treating diseases of the eyes, as a vermifuge, soporific, lactagogue, etc. The seed is widely known as a narcotic, and analyses reveal harmaline, harmalol, and harmine. Harmine is now in use in research on mental disease, encephalitis, and inflammation of the brain. Small doses are stimulating to the brain and reportedly are therapeutic, but in excess harmine depresses the central nervous system. During the Second World War, Nazi "scientists" used harmine to advantage as a truth serum. In reality there is no truth serum, but an alteration in thresholds of consciousness may make a person loquacious. A crude preparation of the seed is more effective than any extract because of the presence of related indoles. The Douvans of Bokhara used to inhale the smoke of burning *Peganum harmala* seed and became quite exuberant,



FIG. 72:
Atropa belladonna

much in the manner of the people of South America using *caapi*, which has the same class of chemicals. This is one of the few clues as to possible historical uses in a shamanic context, and at this time no one has done any thorough research on it.

Notable among the European herbs used to induce hallucinations is the enchanter's nightshade or *Atropa belladonna* (Fig. 72). Known as devil's herb, apples of Sodom, and deadly nightshade, this solanaceous plant is said to be tended by the devil himself, who nightly looks after this plant except on Walpurgis night, when he retires to the mountains to prepare for the witches' sabbath. At such a time the herb may metamorphose into an enchantress lovely to behold, but deadly in the viewing. Another tradition relates that Roman priests would drink an infusion of belladonna before appealing to Bellona, goddess of war. *Atropa* is derived from the name of one of the Greek Parcae, *Atropos*, who was believed to be responsible for measuring out

the thread of a man's life at the time he was born. The ancient Norse knew the plant as *dwale*, meaning trance, stupor, or sleep.

In the Bacchanalian orgies a spiked wine was drunk, which purportedly contained belladonna, mandrake root, and other narcotic adulterants; such additives would explain the frenzy and hysteria that are not characteristic of wine intoxication, and yet figure prominently into the *sparagmos* of the maenads or bacchantes who tore apart living animals and children. *Atropa* also figures into medieval witches' brews and flying ointments along with henbane, mandrake, and the fat of a stillborn child. The mixture was used as an ointment rubbed onto the body or introduced via the mucous membranes of the vaginal labia. This practice is associated with the witch on her "anointed" broomstick.

Bergamo, who wrote about 1470–71, left an unpublished manuscript, now in the Bibliothèque National, Paris, which was translated by Hansen in 1901. In this we find an account of witches who "anoint a staff and ride on it to the appointed place or anoint themselves under the arms and in other hairy places. . . ." Many women were accused of participating in witchcraft in such a manner. Spina in 1523 told of the Inquisition in the diocese of Como, which was carried out in the walled city of Lugano. A wife of a notary of the Inquisition was accused of being a witch and a sorceress. Her husband sought after her when she was absent on Good Friday. He finally encountered her in the pigsty. "There he found her naked in some corner, displaying her genitals, completely unconscious and smeared with the excrement of pigs." She confessed to having made the witch's journey and drowned herself before she could be burned.

Andrés Laguna, physician to Pope Julius III, in 1545 gave an account of seizing from a married couple accused of being a witch and a warlock, a jar half-filled with an unguent he determined to be nightshade, hemlock, henbane (*Hyoscyamus niger*, Fig. 73), and mandrake. Being a physician, he tested his find on the wife of a hangman in the city of Metz. Since the woman suffered from insomnia, Laguna decided to test the baneful unguent, anointing the woman "from head to toe." She fell into a deep sleep for thirty-six hours. Since she had had lascivious and unfaithful imaginations during this period, Laguna concluded that such potions corrupt the memory, leading to the firm belief by the anointed ones that they have done all that they dreamt in a waking state.

Giovanni Battista Porta in 1562 wrote a book on *Natural Magic* in which he elucidated the contents of witch's salve, which he reports he gleaned from speaking with and observing witches. The revelation was as follows (botanical identifications in parentheses are my own): "they mix eleoselinum, aconite (*Aconitum napellus* root), poplar branches (*Populus* tree buds provide a lipid balm as a matrix in which to retain the active principals), and soot. Or sometimes sium (*Helosciadium nodiflorum*, an umbel known as sion and marshwort), common acorum (*Acorus calamus* whose rhizome oils are known to be narcotic), the blood of a bat, sleep-inducing nightshade (*Atropa belladonna*), and oil." All of this was mixed with boy's fat that had been boiled in a copper kettle and strained. After describing the effects on a self-professed witch who stripped before him and anointed herself thoroughly with the mixture, he cautions melancholics who experiment with the

salve, "since their nature is chill and cold nothing very much happens to them from the warming-up methods of witches." Several twentieth-century experimenters have followed the receipt of Porta and experienced the strange visions. Obviously the boy's fat, soot, and bat blood are unnecessary. It should be mentioned that *Aconitum napellus* is a deadly root, and the popular name wolfbane derives from its use in poisoning wolves.

The visions of flying and the common belief of being transformed into one or more of several animals may well explain, in part, the animal alter ego of the shaman. It also sheds light on the vampire (witches were invariably accused of sucking blood), and even the werewolf syndrome. In a book by Porta in 1589 he gives a specific formula for making a man believe that he is transformed into a bird or a beast: henbane, mandrake, stramonium, or *Solanum manicum*, and belladonna. Such a combination would do much to explain lycanthropy. Paulus Aegineta, a

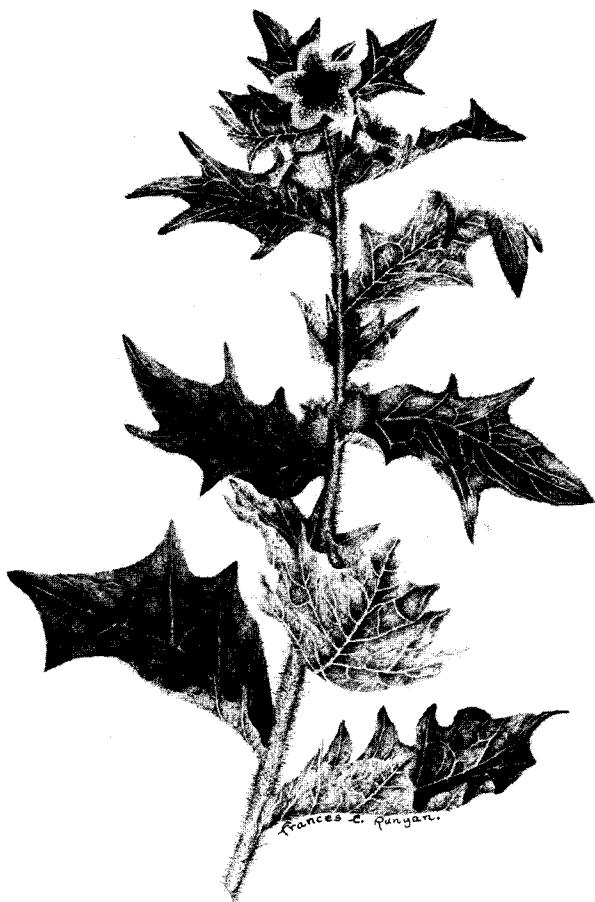


FIG. 73:
Hyoscyamus niger

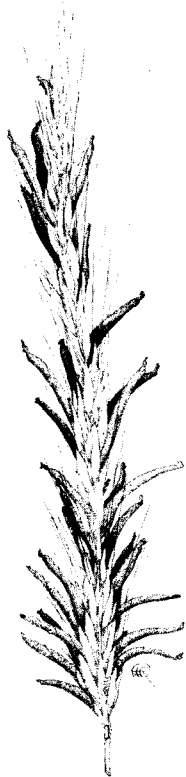


FIG. 74:
Claviceps purpurea

Greek writing of lycanthropy in the fourth to seventh centuries, states that in addition to imitating wolves and lingering about sepulchres, they are recognized by their pale flesh, feeble vision, parched mouth, and ulcerations of the legs from falling a great deal. The formula presented by Porta would produce just such effects due to the abundance of hyoscyamine, scopolamine, and atropine. Thus, there is a botanical, historical, chemical, physiological, and psychological basis for belief in witches, warlocks, sorcerers, vampires, werewolves, and just about every other implausible figure in history. A fine exposition of the role of hallucinogens in European witchcraft was presented by Michael Harner in 1973.

An overview of hallucinogens in Europe would not be complete without an account of "Saint Anthony's Fire," a disease that led its victims on a flight to Egypt to seek help at the shrine of St. Anthony, who had founded an order to care for those afflicted by "Holy Fire." Since the Middle Ages, famine has usually resulted from failure of the staple grain crops upon which most civilizations depend. In times of severe shortage, every ounce of grain becomes a precious commodity, and diseased crops that are usually rejected are ravenously consumed. A peculiar dark grain which the French dubbed *argot*, referring to a spur, became transliterated to ergot.

This is the result of individual grains becoming parasitized during their development by the fungus *Claviceps purpurea* (Fig. 74). Once the grain contacts the spore, it is soon replaced by the fungal body that develops on it producing a dark purple-brown grain-like structure that is about a centimeter in length and furrowed, resembling the normal grain. It has been estimated that a crop infected with less than one per cent of ergot is sufficient to cause an outbreak of the plague known as *ergotisme* or ergotism. Desperate harvesting in famine years resulted in the contamination of bread so that entire villages would fall prey to the disease, which led to the speculation that such villages were possessed of the Devil and suffering in his eternal fires. Pregnant women would spontaneously abort, others would suffer strange delusions and feel their bodies being consumed by flames. After a time, the afflicted would exhibit gangrenous limbs and a number would die. The Order of Saint Anthony, who is easily recognized by his companion the pig, would care for these victims. Until the seventeenth century, a number of these orders exhibited the fallen limbs of their patients as a testimonial to the numbers of afflicted who had been treated.

Midwives soon learned the source of this evil and employed grains of ergot in their practices. They found that five to nine of the ergot grains could be administered to hasten difficult births without any post-parturition hemorrhage. Later ergot was to find its way into diverse medical practices. One of the most popular contemporary uses is to combine the ergot with caffeine to constrict dilated capillaries in instances of migraine headaches. Unfortunately, not all migraines are caused by vasodilation and in some instances the medicine is of no avail.

In 1906 ergotoxine was isolated as the first alkaloid to be derived from this peculiar ascomycete. Later, in 1920, ergotamine and ergotamine were identified, and subsequently close to a dozen other alkaloids have been extracted and identified. Ergometrine (ergonovine) is the component responsible for hemostatic action in the uterus. Isoergine (isolysergic acid) seems to induce apathy and mental depression. Both elymoclavine and lysergol are central nervous system stimulants. The action of d-lysergic acid is that of somnolence and a clouding of consciousness. In 1938 Albert Hofmann of the Sandoz Laboratories synthesized d-lysergic acid diethylamide, which is better known under the initials LSD. The hallucinogenic activity was demonstrated in 1943, for this the most powerful of hallucinogens. In man the effective oral dose of LSD is 0.05 mg. It seems unfortunate that much of the research conducted to determine the possible injurious effects of this hallucinogen has involved massive doses injected in the peritoneal cavity of rodents.

The accounts recorded by Hofmann in April of 1943 are as revealing as any with respect to the action on the human body. After an initial ingestion of what he suspected to be LSD-25, for reason of its being the twenty-fifth isolate in the lysergic acid series, he put the material aside for a week. Then, under controlled conditions he took an oral dose of one-quarter of a milligram of LSD, a large dose for a human, and experienced six hours of spectacular and dramatic visionary experiences involving new and unexperienced levels of consciousness. Since this time, the drug LSD has provoked more controversy than any other. Those who argue that the drug

may precipitate a psychosis are confronted with the dilemma of not being able to ascertain how many of these individuals would have become psychotic in the absence of LSD. Those who argue for its safety must take into account the unpredictable behavior of the participant. The belief that one has the ability to soar may be tested. Flying and levitation are not uncommon to this experience.

While a number of psychiatrists have conducted LSD therapy with some interesting results, there are behavioral patterns that even these neo-shamans cannot predict. In one individual the same dosage has different effects at different times. The widest testing programs were carried out as covert activities of the CIA and the Pentagon in cooperation with the U.S. Army. Over a twelve-year period individuals were being subjected to LSD experimentation, without the drug being identified to the individuals in many instances. This was during a period when civilian medical research was being restricted and curtailed. The Army sought Hofmann for a process whereby they might produce many kilograms of the material. During this period the drug remained illegal, and the penalties for conviction were harsh. A New York *Times* exposé of August 1, 1975, uncovered the aforementioned, making it obvious that the military sought the material as an element in chemical warfare, for the amounts sought would have easily "turned on" a city the size of greater Los Angeles! All of this was carried out while information suggesting chromosomal damage, spontaneous abortion, permanent psychoses, and other disasters resulting from the drug was being systematically fed to the public.

The appearance of a new hallucinogen regularly arouses a kind of moral indignation among the public. New pleasures are always the stimulus for the alteration of existing moral values, so that judgements are rarely rational and have a tendency to reflect fear, confusion, and uninformed moral pronouncements. It is only after some experimentation that drug abuse may be properly defined, unless it is accepted that all drug use constitutes abuse. Laws surrounding LSD use have been based more on panic and power than on research data. None of this suggests that LSD is safe or is not; it does serve to point up the dilemma of the Western world that has lost its shamanism and has not successfully supplanted it with religion. There is every reason to believe that man still requires some respite from his physical and psychological woes and the freedom to step beyond himself. Control by legislation has not historically been of any success.

Lewis Lewin said "man has a passionate desire to flee from the monotony of everyday life." I think that we might append to this the *fear* of everyday life as well. In an age of great uncertainty and great despair, it is understandable that man will attempt to seek other realms, to reach out beyond the impersonal forces of both science and technology to experience a world created both from without and from within. *Induced* personal mysticism is not new to the world, and it is not likely to disappear. Since man first strayed from the non-nutritive aspects of the plant world and explored the realms of consciousness within himself, he has never departed from these forays. Withholding judgment, it is safe to say that man has, and always will attempt to explore his diverse states of consciousness. This renewed broad interest in experimenting with the selves within may best characterize the past several decades of this century as reviewed by some future historian.

APPENDIX II

A Summation of the Botany Geography, Psychopharmacology and Chemistry of Narcotic Plants

This appendix is an abbreviated synopsis of those plants figured in the text. Where several different species of a genus are mentioned, a characteristic species has been chosen to represent the narcotic members of that genus. Common names have been chosen either because they are commonly used in the area to which the plant is indigenous or are widely used. Species names, as well as generic names, correspond to those in current use. Where a name is abundant in the literature, although a synonym, it is presented as well in parentheses following the most frequently used citation. Authors of the species appear in this appendix but not in the text. These will be found immediately following the specific epithet. The narcosis corresponds to the traditional categories represented in the text rather than the categories that have been proposed in Appendix I. The author is aware that such simplification of a behavioral syndrome is imperfect, and the reader is referred to the text and Appendix I for a more complete characterization of the narcosis.

Entries are alphabetized according to genus and species. Question marks have been introduced where the narcosis is based upon inconclusive reports or where the nature of the active principle is in doubt or has not been established with certainty.

The following arrangement is used throughout this appendix:

Genus species (both in italics)	Author (s)	Local or common name
Family		
Habitat		
Botanical description		
Primary narcotic effect		
Active principle(s)		

Acorus calamus L. "Sweet Flag," "Sweet Calomel"

Araceae

Northern United States and Canada

In bogs or marshy areas

Terrestrial herb from creeping rootstock; leaves sword-shaped, to 25 cm or more; the lateral greenish spadix, 5–16 cm long, spathe narrow and not prominent.

Mild hallucinogen

Beta-asarone

Actaea alba (L.) (Mill. *A. pachypoda* Ell.) "White Baneberry"

Ranunculaceae

Eastern Canada south to Georgia, Louisiana, and Oklahoma

Rich wooded areas

Perennial herb, to 1 m tall; leaves large, 2–3 ternately compound; leaflets sharply toothed; flowers small, white in a dense long-peduncled terminal raceme; berries white, with a persistent stigma.

Hypnotic

Unidentified

Actinidia polygama (Sieb. & Zucc.) Maxim. "Chinese Cat Powder"

Actinidiaceae

Japan

Thickets and woods in mountains

A deciduous, scandent shrub; leaves ovate to elliptic 6–15 cm long; often leaves near the inflorescence white on upper half of upper side; flowers axillary, white, pendulous with many stamens; fruit a berry.

Tranquilizer with mild hallucinogenic effects

Metatabilacetone and actinidine

Aesculus glabra Willd. "Ohio Buckeye"

Hippocastanaceae

Central and Eastern United States but not along the southeast coast

Woods, thickets, base of bluffs

Tree to 17 m tall; leaves palmately compound with 5–7 leaflets; flowers greenish-yellow in many flowered, large panicles; fruit prickly with shiny, large, dark-brown seeds.

Hypnotic

Aesculin (esculin)

Aesculus pavia L. "Red Buckeye"

Hippocastanaceae

Most of the Eastern United States

Moist deciduous forests, low woodlands and swamp margins

Shrub or small tree to 4 m tall; leaves palmately compound with leaflets up to 8 cm long; flowers scarlet in a terminal panicle; capsule to 7 cm in diameter with light-brown seeds.

Hypnotic

Aesculin (esculin)

Alchornea floribunda Müll. Arg. "Niando"

Euphorbiaceae

West Tropical Africa, Congo, Uganda

Forests

A leaning, semi-climbing shrub or small tree to 10 m; leaves obovate-oblongate, 20–35 cm long; flowers dioecious, in branched inflorescences, green; fruits capsular.

Hallucinogen

Yohimbine (questionable)

Amanita muscaria L. "Fly Agaric"

Agaricaceae

Temperate areas throughout the world

Under birch, pine beech, and larch trees in forests

Gilled mushroom appearing quite red-orange in the button stage and maturing into fungus
8–10 cm in height with an equally broad cap turning tan with white flecks on the hymen
at maturity.

Hallucinogen

Ibotenic acid and muscimole

Anadenanthera colubrina (Vell.) Brenan "Vilca," "Cebil"

Mimosaceae

Peru, Bolivia, Argentina

Forests

A tree, often attaining a height of 30 m; leaves compound, 12–20 cm long, pinna pairs, 7–35,
leaflets, 20–80 pairs; flower heads globose, white to yellow to orange; pods 10–32 cm
long, 8–16 seeded.

Hallucinogen

N, N-dimethyltryptamine, and related tryptamines

Anadenanthera peregrina Speg. (*Piptadenia peregrina* Benth.)
"Yopa," "Cohoba," "Parica"

Colombia, Venezuela, Brazil

Forests

A shrub or tall tree, 3–27 m; leaves compound, 10–20 cm long, pinna pairs 10–30 or more,
leaflets, 25–80 pairs; flower heads globose, axillary, greenish white to yellowish; pods
5–30 cm long, 8–16 seeded.

Hallucinogen

N, N-dimethyltryptamine, and related tryptamines

Arctostaphylos uva-ursi L. "Bear-berry," "Kinnikinnick"

Ericaceae

Circumpolar, with its varieties

On sandy or rocky soil

Prostrate shrub forming mats to 1 m across; leaves evergreen, leathery, oblanceolate to
oblong-obovate, 1–2 cm long; flowers urn-shaped, whitish fruits, round, bright red and
mealy inside.

Hypnotic

Arbutin and ericolin (these do not explain the narcotic effects)

Areca catechu L. "Betel Nut," "Areca Nut"

Palmae

India, Malaya, Polynesia

Ubiquitous on South Pacific Islands

A slender tree to 25 m; trunk ringed; leaf blades to 1 m across with many pinnae;
inflorescence conspicuous, much-branched; fruit ovoid, orange-scarlet, to 5 cm long.

Slight stimulant

Arecoline

Argemone mexicana L. "Prickly Poppy"

Papaveraceae

Southwestern United States, Mexico

Dry soil in fields and along roadsides

Coarse, prickly, herbaceous perennial with yellow sap; leaves spiny, 10–15 cm long; flowers bright yellow, many stamens; fruit a prickly capsule.

Questionable hallucinogen

Imperfectly known

Argyreia nervosa (Burm.) Bojer. "Silver Morning-glory," "Hawaiian Baby Wood Rose"

Convolvulaceae

Tropical Asia; pantropic in cultivation; used in Hawaii

Semi-forested areas: vine

A coarse silvery liana with cordate leaves to 12 cm long and almost as broad; branches, undersides of leaves and outer surface of corolla covered with silvery-white hairs; corolla funnellform, pale-violet-pink within; fruit a capsule with persistent spreading sepals.

Hallucinations

Ergolines (amides of lysergic acid)

Artemisia absinthium L. "Wormwood," "Absinth"

Asteraceae

Most of Europe, except the islands

Rocks, screes, uncultivated ground

Much-branched, aromatic, silvery perennial with finely divided leaves with silky hairs on both sides; flowers borne in lateral clusters to form a branched pyramidal inflorescence.

Hypnotic; dream delirium

Coumarins, absinthin, absinthol

Atropa belladonna L. "Deadly Nightshade," "Belladonna"

Solanaceae

Central and southern Europe, southwest Asia, Algeria

Wooded hills in shaded areas

A suffrutescent, perennial herb, to 1.5 m tall; leaves ovate, paired, one leaf of each pair larger than the other, 6–18 cm long; flowers bell-shaped, pendant, dingy purple tinged with green; fruit a many-seeded shiny black berry

Hallucinogen

Atropine and scopolamine

Banisteriopsis caapi Morton "Ayahuasca," "Caapi," "Yajé," "Natem pinde"

Malpighiaceae

Brazil, Colombia, Ecuador, Peru

Rain forest

A liana with lenticellate bark; leaves ovate to lanceolate, about 17 cm long, 6.09 cm wide; flowers in axillary panicles, carmine-pink, petals quick falling; fruit a reddish-brown samara.

Hallucinogen

Harmine, harmaline, d-tetrahydroharmine (tryptamines in *B. rusybana*)

Boletus (Tubiporus) Reayi Heim "Nonda ngam-ngam"

Polyporaceae

New Guinea (Wahgi Valley)

Forest (especially growing under *Castanopsis acuminatissima*)

A fleshy fungus with a spongy or porous underside to the cap; the tubular stratum peeling from the upper portion of the cap with some ease; cap from 8–25 cm broad and stipe 2–4 cm thick.

Hallucinogen (?)

Unidentified

Brunfelsia tastevini Benoist "Keya-honé"

Solanaceae

Brazil

Rain forest

A scandent shrub, sometimes a liana; leaves lanceolate, 6–15 cm long; flowers in terminal cymes; corolla tubular, yellowish-white; fruit a berry.

Hallucinogen

Imperfectly known; possibly tropanes, coumarins and the alkaloid scopoletin

Calliandra anomala (Kunth) Macbride "Cabeza de Angel"

Mimosaceae

Mexico and Guatemala

In level or mountainous places and sometimes along streams

A shrub, 1–4.5 m high; bark blackish, leaves compound with numerous leaflets, 2.5–5 mm long; flowers showy, purple-red, the stamens long-exserted; pod densely hirsute.

Hypnotic

Unidentified principle found in the resins

Calea zacatechichi Schlecht. "Thle pela kano"

Asteraceae

Mexico and Guatemala

Level places or hillsides

A multi-branched shrub, to 1 m tall; leaves broadly ovate-triangular, 2–6 cm long; flowers in dense cymose-umbellate panicles, rays white; fruit an achene, 1 mm long.

Hallucinogen (primarily visual)

Unidentified coumarins and lactones

Canavalia maritima (Aubl. Thouars) "Bay Bean," "Frijol de Mar"
 Fabaceae
 Pantropical shore plant
 Beaches and seaside dunes
 Trailing vine; leaves trifoliate, obovate to suborbicular; flowers racemous, rosy-purple;
 fruit a legume prominently ribbed on each side of the upper suture.
 Euphoriant similar to *Cannabis*
 1-Betonicine

Cannabis indica Lam. "Bhang," "Hashish," "Ganja," "Hasheesh"
 Cannabaceae
 India, Pakistan, Iran, etc. (cultivated in many areas)
 Waste places, cultivated in many areas
 Densely branched shrub, rarely exceeding 3 m; leaves palmate, alternate; stems rounded
 (short fibers in phloem); seeds small, globose, heavily marbled. Alternate branching.
 Mild euphoria to vivid hallucinations
 Delta-1-tetrahydrocannabinol and isomers

Cannabis ruderalis Jan. "Weedy Hemp"
 Cannabaceae
 Southeast Russia
 Cultivated fields
 Unbranched shrub, not exceeding 1.5 m in height; similar to *C. sativa* but differing in its
 smaller size, its achene with a marbled surface, distinctly articulated at the base and
 easily detached.
 Mild euphoria or no effects
 Delta-1-tetrahydrocannabinol

Cannabis sativa L. "Hemp," "Pot," "Grass," "Marihuana," etc.
 Cannabaceae
 India, cosmopolitan
 Waysides, disturbed places
 A coarse, strong-smelling, glandular erect annual or perennial, to 14 m tall; leaves palmate
 with 3–9 lance-shaped, toothed segments; flowers dioecious, the staminate in long-
 paniced racemes, pistillate in short leafy axillary glomerules; fruit an achene. Opposite
 branching.
 Mild euphoriant
 Delta-1-tetrahydrocannabinol

Casimiroa edulis La. Lla. v. "Zapote Blanco," "Cochiztzapotl"
 Rutaceae
 Mexico
 Mountain forests, often cultivated

Large tree with a broad dense crown; leaflets 5, elliptic to broadly ovate; flowers small, greenish white; fruit a globose drupe, yellowish with sweet pulp.

Sedating hypnotic

N-benzoyltyramine, methylhistamine, casimiroin, fagarine, and casimirodine

Catha edulis (Vahl) Forsk. "Khat"

Celastraceae

Arabia

Forest or woodland

A shrub or tree, 2–15 m tall; leaves oblong to elliptic, 5.5–11 cm long; flowers in axillary cymes, small, greenish-yellow; fruit capsular with 1–3 seeds.

Stimulant leading to hallucinations; terminating in somnolence

Ephedrine

Catharanthus roseus Don. "Madagascar Periwinkle"

Apocynaceae

Originating in Madagascar, now cosmopolitan; used in United States

Grows in a wide variety of soils, exposures, and climate

Erect everblooming herb or subshrub, 12–25 cm high; leaves oblong, 2–6 cm long; flowers white, rosy-purple or lavender with reddish eye, to 3 cm across; corolla tube narrow, 2 cm long.

Hallucinogen (highly toxic)

Ibogaine-like alkaloids

Cimicifuga racemosa L. "Black Cohosh"

Ranunculaceae

Much of the Eastern USA

Moist or dry woods

Tall perennial herb, 1–2 m high, with large, ternately and pinnately decompose leaves; leaflets coarsely and sharply toothed; inflorescence, a many-flowered, simple, or branched raceme; flowers small, petals lacking; fruit a follicle with roughened seeds.

Hypnotic

Cimicifugin (imperfectly characterized)

Cineraria aspera Thunb. "Mohodu-wa-pela"

Asteraceae

South Africa

Sunny, well-drained slopes

A suffrutescent perennial 0.5 m or more tall; stems, leaves and flower heads white woolly-floccose; leaves runcinate-pinnatifid, 4–8 cm long; flower heads yellow.

Hallucinogen of questionable status

Unknown

Claviceps purpurea (Fries) Tulasne "Ergot"
 Hypocreaceae
 North temperate regions of the world
 Parasite of rye flowers
 Infected rye flowers produce a sclerotium of mycelium supplanting the ovary turning dark purple.
 Hallucinogen
 Ergine, ergonovine, ergotamine, etc. (numerous alkaloids)

Coffea arabica L. "Arabian Coffee"
 Rubiaceae
 Arabia, Tropical Africa
 Shrub areas on hillsides
 A shrub or a small tree, 3–5 m tall; leaves elliptic, 6–12 cm long, glossy; flowers white, in axillary clusters; fruit a 2-seeded deep crimson berry.
 Stimulant
 Caffeine

Cola nitida (Vent.) Schott. & Endl. "Cola Nut"
 Sterculiaceae
 Senegal to Nigeria, Sierra Leone, Ghana, Ivory Coast
 Forest
 A tree, 10–25 m tall; leaves variable, often obovate, 12–16 cm long; flowers whitish or pale-yellow with dark red stripes; fruits of 5 recurved follicles with as many as 10 seeds in 2 rows.
 Stimulant
 Caffeine

Coleus blumei Benth. "El Macho," "El Nene," "El Ahijado"
 Labiatae
 Southeast Asia (cultivated in Mexico)
 Damp shady places
 A perennial herb or sub-shrub, to 1 m tall; leaves toothed, ovate, variously colored, 4–8 cm long; flowers blue, in branched racemes; corolla to 12 mm long; fruit a nutlet.
 Hallucinogen (?)
 Unidentified

Conocybe sp. "Magic Mushroom"
 Agaricaceae
 Narcotic sp. Mexico
 Fields, gardens, bare soil, mosses, greenhouses, decayed wood, charcoal, anthills, dung, etc.
 Pileus hygrophanous, glistening when dry; veil none; spores deep, rich rust color; stipe straight and central, elongate and thin, rarely thick or fleshy, often villous or pubescent; lamellae usually at first strongly adscendate.
 Hallucinogen
 Psilocybin

Coriaria thymifolia Humb. & Bonpl. "Shanshi"

Coriariaceae

Ecuadorian Andes

Mostly on steep cliffs or terraces

A slender shrub, 1–3 m tall, with distichous leaves on short lateral branches, all spreading in one plane, 1–2 cm long; flowers tiny in slender racemes; fruits dark-purple, 3–4 mm in diameter, juicy.

Hallucinogen giving a sensation of flight

Sesquiterpenes: coriamyrtine, coriatine, tutine, and pseudotutine

Cypripedium calceolus L. var. *pubescens* Willd. (Correll) "Yellow Ladyslipper"

Orchidaceae

Northeastern Canada, south to Georgia, west to Arizona and New Mexico

Shaded woods

Terrestrial orchid to 20 cm tall; leaves 3–5, somewhat 2-ranked, plicate, sheathing the stem; flowers showy, large; inflated lip dull to bright yellow outside, spotted dark red or purple on the inside.

Hypnotic, sedation, and lassitude

Unidentified

Cytisus canariensis (L.) (*Genista canariensis* L.) Kuntze "Canary Island Broom"

Fabaceae

Canary Islands. Naturalized in California, Mexico

Rocky hillsides, dry places, heaths, etc.

An evergreen, much-branched shrub to 2 m; leaves 3-foliate, small; flowers in many-flowered racemes, bright-yellow, petals 12–14 mm long; pod 12–20 mm long, pubescent.

Mild hallucinogen

Cytisine

Datura candida (Pers.) Safford "Maikoa," "Queen of the Night"

Solanaceae

South America (north)

Forested areas

Shrub or woody tree to 20 m, corolla tube white, 12–15 cm long; foliage oblanceolate, densely tomentose; branching dichotomous to sub-dichotomous; fruit a capsule.

Hallucinogen and hypnotic

Scopolamine, hyoscyamine, and atropine

Datura innoxia Mill. "Toloache"

Solanaceae

Mexico, southwestern United States

Dry open places, disturbed areas

Coarse, scandent annual; leaves ovate, 5–12 cm long; corolla tube white, 15–18 cm long, 10-toothed; capsules ovoid, 6–6.5 cm in diameter, spiny.

Hallucinogen and hypnotic

Scopolamine, hyoscyamine, and atropine

Datura metel L. (*D. fatuosa* L.) "Unmata"

Solanaceae

India; naturalized in the Mediterranean region

Waste places, river sands

Pungent, densely hairy, grayish annual to 1.5 m long; leaves entire or shallowly lobed; flowers large, 18–24 cm long, white often flushed with pink; fruit pendulous, spiny.

Hypnotic and hallucinogen

Scopolamine, meteloidine, hyoscyamine, norhyoscyamine, norscopolamine, cuscohygrine, and nicotine

Datura sanguinea R. & P. "Huanto"

Solanaceae

Peru

Highlands

A tree-like shrub, 1–4 m tall; leaves clustered, narrow-oblong, to 15 cm long; flowers tubular, pendulous, orange-red with yellow nerves; fruit a turbinate capsule, to 6 cm long.

Hallucinogen and hypnotic

Scopolamine, hyoscyamine, and atropine

Datura stramonium L. "Jimsonweed"

Solanaceae

Cosmopolitan

Waysides, disturbed places, etc.

An erect, few-branched annual; leaves elliptic to ovate, 5–20 cm long; corolla tube white or pale-lavender, 5-toothed, 6–10 cm long; capsules ovoid, 3–5 cm in diameter, spiny or smooth.

Hallucinogen and hypnotic

Scopolamine, hyoscyamine, and atropine

Delphinium consolida L. (*Consolida regalis* S. F. Gray) "King's Consound"

Ranunculaceae

Most of Europe except the islands and the south, and most of the Balkan peninsula

Fields and dry places

Annual to 50 cm tall; leaf segments all linear; flowers dark or light blue.

Hypnotic

Delphinine, delphinedine, ajacine

Desfontainea spinosa v. *hookeri* (Dun.) Reiche "Taique," "Chapico"

Desfontaineaceae

Chile

Hillsides or highlands

A shrub, 1.5–2.5 m tall; leaves, holly-like, 5–7 cm long; flowers tubular, red tipped with bright yellow; fruit a yellowish berry.

Hallucinogen

Unidentified

Duboisia myoporoides R. Br. "Pituri"

Solanaceae

Australia

Forests

A shrub or tree to 12 m; leaves elliptic, 4–8 cm long; flowers white, tiny, bell-shaped, in terminal clusters; fruit a globular black berry.

Stimulant, secondarily a hallucinogen

Scopolamine, hyoscyne

Elaeophorbia drupifera (Thonn.) Stapf. "Kankan," "Dodo"

Euphorbiaceae

Guinea, Sierra Leone

Forests and coastal plains

Tree-like succulent with a milky sap, branching above, to 5 m; branches slightly 5-angled; leaves obovate-elongate, 15–23 cm long; flowers in a cyathium, small.

Hallucinogen (?)

Unidentified principle in the latex

Elaphrium bipinnatum (DC) Schlecht. "Palo Copal"

Burseraceae

Mexico (south-central)

Dry places

A shrub or sometimes a small tree to 12 m tall; leaves fern-like, with numerous small leaflets; flowers tiny, whitish; fruit a small 3-angled drupe, containing a single seed.

Stuns without impairing motor coordination

Unidentified

Epilobium angustifolium L. "Fireweed"

Onagraceae

Circumboreal America and Eurasia

Moist soils rich in humus; abundant after fires

Tall perennial to 2 m; leaves numerous, lanceolate; flowers rosy-purple, many in a long, cylindrical, leafless terminal spike; fruit a 4-angled capsule.

Hypnotic used to fortify *Amanita muscaria*

Unidentified

Erythrina sp. "Coral-Tree"

Fabaceae

Southwestern United States and Mexico, Guatemala

Flat, dry areas

Woody shrubs to fairly large trees, usually spiny; leaves with 3 broad leaflets; flowers usually bright red or scarlet, showy, in dense racemes; fruit a long pod with bright-colored seeds.

Hallucinogenic stupor

Indoles and isoquinolines; imperfectly known erythrinanes

Erythroxylum coca Lam. "Coca"

Erythroxylaceae

Peru, Bolivia, Ecuador

Highlands

A densely leafy shrub, 1–2 m tall; leaves elliptic, strongly 3-veined, golden-green, 4–7 cm long; flowers axillary, white, small; fruit an orange-red drupe.

Euphoriant and stimulant

Cocaine

Foeniculum vulgare Mill. "Fennel"

Apiaceae

Southern Europe and southwest United States

Waste places, disturbed areas, waysides

A short-lived perennial, 1–2 m tall; leaves 3–4 pinnately compound with the ultimate segments thread-like, very aromatic; flowers in large greenish-yellow umbels.

Epileptiform convulsions and hallucinations

Unidentified oil distillate

Galbulimima belgraveana (F. Müll.) Sprague "Agara"

Himantandraceae

Papua, New Guinea

Rain forest slopes

A tree to 15 m tall; leaves leathery, 9–14 cm long; branches and undersides of leaves covered with peltate scaly indumentum; flowers on short axillary branches, yellowish, many stamens; fruit gall-like, turning red with age, to 1 cm in diameter.

Hallucinogen; the narcosis progresses to an ultimate stupor or coma

Himbacine, polycyclic piperidine derivatives

Gelsemium sempervirens L. (Ait.) f. "Yellow Jessamine"

Loganiaceae

Southeastern United States

Thickets, woodlands, fence rows, and roadsides

Climbing or trailing vine; leaves evergreen, lanceolate to elliptic, 2–70 m long; flowers fragrant, bright yellow, usually solitary; fruit a capsule with many seeds.

Hypnotic

Gelsemine, gelseminine, gelsemoidine—all nerve poisons

Gnaphalium polycephalum Michx. (*G. obtusifolium* L.) "Sinjachu"

Asteraceae

Most of the eastern United States and Canada, south to Texas

Open sandy places

Annual or maybe biennial, fragrant herb to 1 m tall; leaves numerous, linear-lanceolate, green above, white woolly below; flowers in a many-branched, flat or round-topped, often elongate inflorescence.

Hypnotic

Unidentified

Gomortega keule Johnston "Keule," "Hualhual"

Gomortegaceae

Chile

Forest slopes

A large tree to 25 m; leaves aromatic, evergreen shiny; flowers in axillary and terminal racemes or panicles; fruit drupaceous with a bony endocarp, 2–3 seeded.

Hallucinogen or, possibly, irritant

Essential oils in the fruit

Gymnopilus spectabilis (Fr.) A. H. Smith (*Pholiota spectabilis* Fr.)

"Waraitake," "Maitake"

Agaricaceae

Widely distributed in the United States; also Japan

Earth, buried wood, stumps and logs of hardwoods and conifers

Pileus convex, nearly flat in age, dry, buff, yellow to yellow-orange, hairless or hairy in age; spores orange or rusty-orange; lamellae adnate to short decurrent, crowded, mustard-yellow to orange-buff; stipe to 20 cm long, same color as pileus above, sometimes club-shaped; veil membranous, persistent.

Hallucinogen

Unknown

Heimia salicifolia (HBK) Link & Otto "Sinicuichi"

Lythraceae

Texas, Mexico, and Central America

Along streams

A spreading, branched shrub to 3 m; leaves linear-lanceolate, 2–5 cm long; flowers yellow, petals early deciduous; fruit an obovoid ribbed capsule.

Hallucinations, primarily auditory; vision suffused with yellow

Sinicuichine, cryogenine

Homalomena ereriba Schott.

Araceae

Papua, New Guinea

Rain forest slopes

Terrestrial herb from short rootstock; leaves dark-green above, paler beneath; spathe greenish.

Questionable, admixture to *Galbulimima belgraveana*

Unidentified

Humulus lupulus L. "Hop"

Cannabaceae

Europe, Asia, North America

Hedges, damp places, cultivated

Climbing perennial vine; leaves oval, 3–5 lobed, toothed, 10–15 cm long; flowers dioecious, male inflorescences branched, pendulous, female stalked, cone-like; fruit an achene in cone-like clusters

Sedating, soporific

Unidentified principles in the resins

Hyoscyamus niger L. "Henbane"

Solanaceae

Europe

Waste places, waysides, sandy areas

A coarse, sticky, hairy biennial or annual, 20–80 cm tall; leaves oblong, 15–20 cm; flowers dull-yellow with a network of purple veins; fruit a capsule enclosed by the papery calyx.

Hallucinogen and sedative

Hyoscyamine and scopolamine

Ilex cassine L. "Dahoon," "Black Drink"

Aquifoliaceae

Southeastern United States

Cypress ponds and bogs

Large shrub or small tree; leaves elliptic to lanceolate, coriaceous, 28 cm long; staminate flowers in short, axillary compound cymes; pistillate flowers solitary or in 3-flowered cymes; fruit drupaceous, bright red.

Hypnotic

Unknown

Ilex paraguayensis St. Hil. "Maté"

Aquifoliaceae

Brazil, Argentina, Paraguay

Near streams

An evergreen shrub or small tree to 7 m; leaves serrate, elliptic-obovate, 2.5–8 cm long; flowers tiny, white, in axillary clusters; fruit a reddish berry.

Stimulant

Caffeine

Iochroma fuschoides (H. B. K. Miers) "Borrachero"

Solanaceae

Andean area of Ecuador

Forests

Large shrub to 2 m or more; leaves glabrous, ovate, 5–12 cm long; flowers orange-scarlet, tubular, 5 cm long.

Hallucinations

Unidentified

Ipomoea violacea L. (*Ipomoea rubro-coerulea* Cav.) "Quiebra Plata"

Convolvulaceae

Mexico

Hillsides, most thickets, etc.

A twining vine; leaves cordate-ovate, to 7 cm long and nearly as wide; corolla funnellform, violet-blue to reddish-purple; fruit a several-seeded capsule.

Hallucinogen

Amides of lysergic acid

Justicia pectoralis Jaq. v. *stenophylla* Leonard "Bolek-hena"

Acanthaceae

Venezuela, northern Brazil

Forests

An erect herb to 20 cm tall; leaves narrowly lanceolate; 2–6 cm long; flowers purple, white, or lilac, in elongate, mostly one-sided spikes; fruit capsular.

Hallucinogen

Tryptamines (?)

Kaempferia galanga L. "Maraba"

Zingiberaceae

New Guinea

Usually in open grassy areas

A smooth stemless herb arising from a tuberous aromatic rootstock; leaves orbicular, spreading horizontally, 7–15 cm long; flowers white or pale-pink with violet spot prominent.

Hallucinogen

Unidentified principle in volatile oils of the rhizome

Lactuca quercina L. "Wild Lettuce"

Asteraceae

Central and eastern Europe from Bulgaria north to central Germany and south-coast Russia

Woods and scrubland

Erect annual or biennial to 1.5 m tall with thin leaves, sagittate-amplexicaul base; flowers yellow in a dense corymbose panicle.

Hypnotic

Lactucarium

Lactuca virosa L. "Wild Lettuce"

Asteraceae

Central and southern Europe

Waysides, uncultivated ground, rocky places

Stiff, erect biennial to 1.5 m tall with the blades of the stem leaves held horizontally; leaves lobed or toothed, sometimes entire; flowers yellow in a lax, much-branched leafless inflorescence.

Hypnotic

"Lactucarium," an imperfectly characterized complex from the laticifers of the plant.

Lagochilus inebrians Bunge. "Intoxicating Mint"

Lamiaceae

Central Asia, Russia

Steppes

A shrub to 1 m tall, leaves 3-lobed, each lobe spine-tipped, pubescent; 1.5–2.5 cm long; calyx spiny, ribbed; corolla white, covered with silvery hairs; fruit a nutlet.

Tranquilizer (hallucinogen ?)

Lagochiline and/or a polyhydric alcohol

Latua pubiflora (Gris.) Phil. "Latue"

Solanaceae

Chile

Moist shaded areas

A spiny shrub or small tree, 3 m or more high; leaves lanceolate, 4–6 cm long; flowers violet, axillary; fruit a lemon-yellow berry.

Hallucinogen

Atropine and scopolamine

Leonorus sibiricus L. "Siberian Motherwort," "Marahuanilla"

Lamiaceae

Endemic to Siberia and China; naturalized in the eastern United States, tropical America, and the Gulf Coast

Waste places

Biennial with stems to 1.5 m tall; leaves broadly ovate to rotund in outline, deeply 3-parted, laciniately toothed; flowers in axillary whorls subtended by bracteal leaves and linear bracts, pink; plant strong-scented.

Euphoriant and hypnotic

Leonurine

Leonotis leonurus R. Br. "Lion's Ear," "Lion's Tail," "Dagga," "Twalainoyani"

Lamiaceae

South Africa

Grassland

Branched shrubby perennial, 1–2 m tall, leaves lanceolate, 4–12 cm long, serrate; flowers in dense axillary whorls, bright orange-red, pubescent; fruit consisting of four nutlets.

Mild euphoriant

Unidentified resins from the inflorescence

Lobelia tupa L. "Tupa," "Tabaco del Diablo"

Lobeliaceae

Chile

Wooded slopes, in open and among shrubs

A stately perennial herb, 1.5–2.5 m tall; leaves lanceolate, 16–20 cm long; flowers bright scarlet-red, in long terminal racemes; fruit a capsule.

Hallucinogenic stupor

Lobeline and its keto- and dihydroxy derivatives

Lophophora williamsii (Lem.) Coult. "Peyote," "Mescal Button"

Cactaceae

Texas, north Mexico

Deserts

A small, globose cactus with a carrot-shaped taproot, c. 4 cm high and 6–10 cm in diameter; surface blue-green; flowers small, pale-pink or white.

Hallucinogen

Mescaline and over thirty phenylethylamines and simple isoquinolines

Lycoperdon marginatum Heim "Gi'-i-sa-wa"
 Lycoperdaceae
 Oaxaca, south, around San Miguel (Mixtec)
 Above 2000 m in mountain meadows
 "Puffball" with a membranous peridium and a dense white interior when immature; at maturity the interior darkens and crumbles to a dark mass of spores; opening by apical perforations.
 Hallucinogen
 Unidentified alkaloid in mature spores (psilocybine (?), Ibotenic acid (?))

Lycopodium selago L. "Fir Clubmoss"
 Lycopodiaceae
 With its varieties, circumpolar
 Woods, bogs and heaths
 Stems short, ascending and divided regularly into branches of equal length; leaves imbricate, in many rows along the stem.
 Hypnotic
 Lycopodine (?)

Mandragora officinarum L. "Mandrake," "Mandragora," "Satan's Apple"
 Solanaceae
 Southern Europe
 Stony places, deserted cultivation
 A perennial with a stout, often branched taproot to 1 m long; leaves in a basal rosette, to 25 cm long; flowers violet, bell-shaped, on a short stalk, 2–5 cm high; fruit a round, smooth, deep-yellow berry.
 Hallucinogen; followed by a death-like somnolence
 Scopolamine, hyoscyamine, mandragorine, and atropine

Methysticodendron amesianum Schultes "Culebra-Borrachera"
 Solanaceae
 Southern Colombia
 Forested mountain areas
 A tree to 5 m; leaves long-linear, crenulate, 12–25 cm or more; flowers long-tubular, to 25 cm or more; white.
 Hallucinogen
 Hyoscyamine, norhyoscyamine and scopolamine

Mimosa hostilis Benth. "Vino de Jurema"
 Mimosaceae
 Brazil
 Forests
 A viscid puberulent shrub; leaves compound pinnate; flower's spikes c. 2.5–5 cm long; corolla 4-parted, 8 stamens; legume viscid puberulent, flat.
 Hallucinogen
 Unidentified

Mirabilis multiflora (Torr.) Gray "So'ksi"

Nyctaginaceae

Arizona, Utah, New Mexico, Texas and northern Mexico

On hillsides and mesas, often among rocks and shrubs

An herbaceous perennial, somewhat scandent; leaves ovate, to 4 cm long; corolla tube often exceeding 4.5 cm, purple-red, generally more than 3 flowers in each involucre; fruit a ribbed achene.

Hallucinogen (?)

Unidentified

Mitchella repens L. "Partridge Berry"

Rubiaceae

Eastern United States, Canada, Mexico, and Japan

Dry or moist woods

Trailing perennial, forming mats; stems rooting at the nodes; leaves evergreen, round-ovate, less than 2 cm long; flowers in pairs, mostly terminal, small, white or tinged pink; berry red.

Hypnotic

Unidentified

Mitragyna speciosa Korth. "Kutum," "Kratom," "Mambog"

Rubiaceae

Malay peninsula

Open country

A large tree, 12–16 m tall; leaves oblong-ovate, 8–12 cm long; flowers in globose heads of 3, deep-yellow; seeds winged.

Hallucinogen

Mitragynine and eight similar compounds

Monadenium lugardae N. E. Br. "Tshulu," "Mhlebe"

Euphorbiaceae

South Africa

Arid plains; open places

Fleshy succulent with a tuberous root, 12–60 cm high; leaves terminally crowned, spatulate, 1.5–9 cm long; flowers in solitary cymes, greenish; fruit a 3-angled capsule.

Hallucinogen

Methylamines (uncertain)

Monotropa uniflora L. "Corpse Plant," "Indian Pipe"

Monotropaceae

Most of the United States and Canada south to Central America

Rich woods in leaf-mold

Saprophytic plant lacking chlorophyll, to 25 cm tall; leaves reduced to scales; flowers urceolate, white, nodding and solitary.

Hypnotic

Undetermined

Myristica fragrans Houtt. "Nutmeg"

Myristicaceae

Moluccas, Banda Islands, Malayan archipelago

Open areas of the tropics

A tree to 8 m tall; leaves elliptic, 8–12 cm long; flowers dioecious, small; fruit a pendulous globose drupe, splitting into 2 valves disclosing the scarlet aril or mace surrounding the seed which is encased in a hard shell.

Hallucinogen

The oils myristicin and elemecin (a fraction of the former)

Nanathus albinotus (Haw.) Bol. [*Rabiea albinota* (Haw.) Br.] "S'Keng-keng"

Aizoaceae

South Africa

Dry open places

Dwarf, compact succulent; leaves fleshy, sabre-shaped, 3-angled above, covered with whitish flecky prominent dots; flowers yellowish.

Hallucinogen

Unidentified

Nicotiana rustica L. "Turkish Tobacco"

Solanaceae

Eastern United States

Waste places, open areas, etc.

A strong-smelling, glandular, hairy annual, 30–100 cm tall; leaves stalked, ovate-cordate, 6–10 cm long; flowers in dense terminal clusters, greenish-yellow; fruit a many-seeded capsule.

Protoplasmic poison and retardant to neural transmission

Nicotine primarily, harman

Nicotiana tabacum L. "Tobacco"

Solanaceae

Of hybrid and tetraploid origin. Brazilian progenitors

Cultivated

An erect, acrid annual, 1–2 m tall; leaves clasping, ovate-lanceolate, 20–45 cm long; flowers pale-pink or purple, in terminal clusters; fruit a many-seeded capsule.

Protoplasmic poison and retardant to neural transmission

Nicotine primarily, harman

Nymphaea ampla (Salisb.) D. C. "Quetzalaxochiatl," "Precious Water-lily,"
"White Water-lily"

Nymphaeaceae

Tropical and subtropical America from Mexico to Brazil

Aquatic perennial with submerged rootstocks and floating leaves

Leaves sub-orbicular, to 4 cm across, with sinuate margins; flowers white, 12 cm in diameter, with 7 to 21 petals.

Hypnotic and hallucinogen

Aporphine (an apomorphine-like alkaloid), nupharine, nupharidine

Nymphaea caerulea Sav. "Sacred Lily of the Nile," "Blue Water-lily"
 Nymphaeaceae
 Northern and central Africa
 Aquatic perennial with submerged rootstocks and floating leaves
 Leaves sub-orbicular, 1–1.5 m in diameter, with more or less entire margins, purple-spotted beneath; flowers 9–18 cm in diameter, pale blue with a white center open only in the forenoon for 3 days.
 Hypnotic and hallucinogen
 Nupharine, nuciferine, nupharidine and possibly aporphine

Olmedioperebea sclerophylla Ducke "Rape dos Indios"
 Moraceae
 Brazil
 Rain forests
 A large tree, 25–35 m tall; leaves ovate, 20–30 cm long; male and female flowers borne in separate receptacles, small; fruit a drupe, 2–2.5 cm in diameter.
 Hallucinogen
 Undetermined

Pancratium trianthum Herb. "Kwashi"
 Amaryllidaceae
 West Africa
 Open places
 Perennial arising from a globose-ovoid bulb; leaves linear, flaccid, elongate; flowers whitish with a broad pink band up the outer lobes, the tube 12–15 cm long.
 Hallucinogen
 Unidentified

Paneolus papilionaceus Fr. "Waraitake," "Maitake"
 Agaricaceae
 Eastern United States and Canada, Japan
 Soil and rich dung
 Pileus somewhat fleshy, at first hemispherical, sometimes subumbonate, the cuticle breaking up into scales when dry, pale-gray with a tinge of reddish-yellow, c. 2.5 cm broad; lamellae broadly attached to the stipe, black; stipe to 10 cm long, slender, firm, hollow, whitish, sometimes with red or yellow tinge.
 Hallucinogen
 Probably psilocybin and psilocin, both of which are present in *Paneolus sphinctrinus*

Passiflora incarnata L. "Coanepilli," "Serpent's Tongue"
 Passifloraceae
 Southeast United States
 Fields, roadsides, fence rows, and thickets

Trailing or climbing vine to 2 m long; leaves palmately 3-lobed; flowers axillary, solitary, bluish-white, the corona segments lavender-white, banded with purple; fruit a green or yellow berry to 7 cm long.

Euphoriant and hypnotic

Passicol, harmol, harman, harmine, harmalol, and harmaline

Passiflora jorullensis H.B.K. "Coanenepilli"

Passifloraceae

Mountains of central and southern Mexico

Forests

Trailing or climbing vine; leaves bilobed or trilobed one-third of their length, the lobes rounded or subacute, mucronulate, 6 cm long; flowers in axillary pairs, orange-red, small; fruit globose, 5 cm in diameter, lustrous black.

Euphoria similar to *Cannabis*

Passicol, harmol, harman, harmine, harmalol, and harmaline

Papaver somniferum L. "Opium Poppy"

Papaveraceae

Central Europe, the Levant

Fields, waysides, waste places

An erect glaucous annual, 0.5–1.5 m tall; leaves clasping, 7–12 cm long, deeply toothed; flowers to 10 cm across, white, lilac, or purple with or without dark basal blotch; fruit a capsule with many seeds.

A feeling of well-being

Morphine, codeine, and twenty-four other alkaloids

Paullinia cupana H.B.K. "Cupana," "Guarana"

Sapindaceae

Brazil

Forests

A scandent or sub-erect liana; leaves compound, 5-foliate, 10–20 cm long; flowers white, tiny, in panicles; fruit an apiculate capsule, dark red in maturity; seed dark brown.

Stimulant

Caffeine

Peganum harmala L. "Syrian Rue," "Zit-el-Harmel"

Rutaceae

Turkey, Syria

Waste places, steppes

An erect perennial herb, 30–70 cm tall; leaves finely dissected into linear segments, 3–5 cm long; flowers solitary, white; capsules slightly stalked.

Hallucinogen

Harmine and related indoles

Pernettya furens (H. & A.) Kl. "Huedhued," "Hierba Loca"

Ericaceae

Chile

Open fields or clearings in woods

A shrub, 1–1.5 m tall; leaves ovate, 2.5–5 cm long, finely serrate; flowers urn-shaped, white, in short nodding racemes; fruit a many-seeded berry enclosed by the persisting calyx.

Hallucinogen

Possibly andromedotoxine and/or arbutin

Pholiota spectabilis Fr. (*Gymnopilus spectabilis*) "Waraitake," "Maitake"

Agaricaceae

Southern Canada, mountains of western United States, central and eastern states, Japan

Decayed oak stumps

Stipe, 7–10 cm tall, thick, tough, spongy and thickened toward the base; pileus, compact, convex, then plane, dry, torn into silky scales which disappear toward the margin, golden-orange in color; gills, narrow, crowded, yellow then ferruginous.

Hallucinogen

Unidentified

Phytolacca americana L. "Pokeweed"

Phytolaccaceae

Much of the eastern United States

Waste ground and pastures, usually disturbed habitats

Robust perennial to 2 m tall with one to many stems from the root crown; roots thick and fleshy; leaves lanceolate, entire, 4–11 cm long; flowers racemose, green to whitish; berry purplish-black at maturity.

Hypnotic, may induce respiratory failure

Phytolacine

Piper betel L. "Betel"

Piperaceae

Southeast Asia, Polynesia

Shaded wooded areas

A glabrous climbing vine; leaves fleshy, ovate, 10–14 cm long; male spikes cylindric, female spikes to 4 cm long; fruit a drupe.

Unknown (additive to *Areca*)

Unidentified

Piper methysticum Forst. "Kava Kava"

Piperaceae

Polynesia, Sandwich Islands, South Sea Islands

West forests

A shrub, 1.5–4 m tall; leaves cordate-ovate, 13–22 cm long and almost as wide; flowers dioecious in densely flowered short spikes.

A state of well-being followed by somnolence

Marindin, dihydromethylsticin, and others

Psilocybe sp. "Magic Mushroom"

Agaricaceae

Narcotic sp. (Sect. *Caerulescentes*) Mexico and Central America

Sticks, stems, mud, peat, earth, humus, deep moss beds, dung, sawdust, straw, or dead wood

Pileus cylindric conic or semiglobate to convex, campanulate, often umbonate or papillate, viscid or dry; spores deep lilac to sepia; stipe not viscid, glabrous or with a fibrillose coating; lamellae broad, adnexed to adnate; a few species annulate.

Hallucinogen

Psilocybin and psilocin

Psychotria viridis R. & P.

Rubiaceae

Ecuador, Peru

Forests, western Amazon

A shrub or small tree to 4.5 m tall; leaves obovate or ovate-oblong, 6–9 cm long; inflorescence spicate-paniculate, many flowered; flowers whitish, minute; fruit baccate, red.

Hallucinogen

N,N-dimethyltryptamine

Rauvolfia tetraphylla L. (*Rauvolfia canescens* L.) "Pinque-pinque"

Apocynaceae

Central and northern South America, West Indies

Savannahs

Shrub to 1 m tall; leaves usually in whorls of four, the members of a whorl unequal, ovate, 4–12 cm long; flowers in axillary and terminal cymes, greenish-white, tiny; fruit a red drupe, becoming black.

Tranquilizer

Reserpine (?)

Rauvolfia serpentina (L.) Bth. "Sarpaganda"

Apocynaceae

India, Malaysia

Sunny or shaded, periodically dry localities

Shrub to 1 m tall; leaves oblong or elliptic, 7–25 cm, usually 3-verticillate; flowers in cymes, corolla tube slender, reddish-pink; fruit a globose black drupelet.

Tranquilizer

Reserpine

Rhyncosia longiracemosa Mart. & Gal. "Piule"

Fabaceae

Southern Mexico

Moist wet thickets or forest, often on limestone

An herbaceous vine, varying in size; leaves 3-foliate, leaflets, 4–7 cm long; flowers in long many-flowered racemes; corolla wings yellow, standard reddish-brown; pod contains small, compressed dark-brown seeds.

Hallucinogen

Cystine

Rhyncosia pyramidalis (Lam.) Urban "Piule"

Fabaceae

Southern Mexico, Guatemala

In wet to dry thickets

An herbaceous vine, varying in size; leaves 3-foliate leaflets, 3–12 cm long; flowers in racemes; corolla reddish-yellow; pod contains scarlet seeds with a black end.

Hallucinogen

Cystine

Rivea corymbosa Hall. [*Turbina corymbosa* (L.) Raf.] "Ololiuqui"

Convolvulaceae

Mexico

Moist or wet thickets, often weedy in hedges

A large to small woody vine, often climbing over small trees; leaves ovate-cordate, 4–10 cm long; flowers funnelform, white, in dense panicles; fruit a 1-seeded capsule.

Hallucinogen

Ergine, isoergine and minor alkaloids

Salvia divinorum Epl. & Jativa "Pipiltzintzintli"

Lamiaceae

Mexico

Moist places in ravines

A perennial sprawling herb, to 3 m or more; leaves ovate, 12–15 cm long; flowers white, subtended by violet bracts, verticillate on an inflorescence 30–40 cm long; fruit a nutlet.

Originally described by Epling as having blue flowers.

Hallucinogen

Unidentified (in study by Sandoz Laboratories)

Sarcostemma acidum Voight (*Sarcostemma brevistigma* W. & A.) "Soma"

Asclepiadaceae

India

Stony places

A twining, leafless sub-shrub; branches cylindrical; flowers in umbels terminating short lateral branches, greenish-white; fruit a bivalved follicle; seeds comose.

Hallucinations and giddiness

Undetermined

Sceletium expansum (L.) L. Bol. "Khana"

Aizoaceae

South Africa

Dry open places

A prostrate shrub to 30 cm high; leaves 4 cm long, lanceolate, persisting after withering as skeletons; branches and leaves covered with fine papillae; flowers dull yellow, many petals.

Hallucinogen (?)

Mesembrine and mesembrenine

Sclerocarya caffra Sond. "Marula"

Anacardiaceae

South Africa

Lowveld

A branched tree to 18 m; leaves compound, 7–13 foliate, 15–30 cm long; flowers dioecious, male inflorescences in racemes, female solitary; fruit a yellow, plum-sized drupe.

Hallucinogen (?)

Unidentified

Senecio hartwegii Benth. "Peyote de Tepic"

Asteraceae

West-central Mexico

Dry places

Shrub; branches, petioles and lower leaf surfaces tomentose; leaves suborbicular, 1–6 cm long, palmately 7–9 nerved, repand-angulate; flower heads yellow, small.

Neurotoxin producing delusions

Pyrrolizidine alkaloids

Solanum nigrum L. "Black Nightshade"

Solanaceae

Cosmopolitan weed, probably native of Eurasia

Waste places throughout; sometimes in moist ground

Annual, to 1.5 m tall, often widely branched; leaves thin, ovate-lanceolate, acuminate; inflorescences lateral from the internodes, umbelliform, 2–10 flowered; petals white or occasionally pale violet; berries globose black or dark yellow in var. *villosum*.

Neural poison

Solanine

Sophora secundiflora (Ortega) Lag. "Mescal Bean"

Fabaceae

Texas, New Mexico, and northern Mexico

Usually on limestone hills

Evergreen shrub or occasionally a tree to 9 m; compound leaves deep-green, 8–14 cm long; flowers in pendulous racemes, mauve-violet, very fragrant; pod to 10 cm long containing 1–8 red seeds.

Hallucinogen (highly toxic)

Cystine (ulexine, baptitoxine, sophorine)

Stipa vaseyi Scribn. [*S. robusta* (Vasey) Scribn.]

"Popoton Sacaton," "Sleepy grass"

Poaceae

Colorado to western Texas, Arizona, and northwestern Mexico

Dry plains and hills and dry open woods

Perennial grass to 1–1.5 m tall; panicle compact, larger than in *S. viridula*, plants robust; glumes firm with inconspicuous nerves.

Hypnotic

Unidentified

Stipa viridula Trin. "Green Needlegrass"

Poaceae

Central Canada, central and eastern United States, southwest to Arizona

Plains and dry slopes

Perennial grass to 1 m tall; panicle slender and loose, plants rather slender; glumes thin and papery.

Hypnotic

Unidentified

Stropharia sp. "Magic Mushroom"

Agaricaceae

Narcotic species in western United States, Mexico, Central and South America, Hawaii, etc.

Soil, foliage, dung; rarely on decayed wood or sawdust

Pileus viscid or humid, white or bright colored; spores deep lilac to blackish lilac (when fresh); stipe straight or somewhat flexuous, longer than the diameter of the pileus, always annulate; lamellae (gills) adnexed to adnate; veil usually membranous.

Hallucinogen

Psilocybin and psilocin

Tagetes lucida Car. "Yauhtli," "Hierba de Nube"

Asteraceae

Mexico

Woods, hillsides, rocky slopes

Perennial aromatic herb, to 1 m tall; leaves lanceolate, finely serrate; flowers bright yellow in dense terminal cymes.

Benumbing (classic náhuatl use), confusion

Coumarins, lactones, and terpenes

Tabernanthe iboga Baill. "Iboga"

Apocynaceae

Gabon and parts of the Congo

Forests

Shrub 1–2 m tall; leaves lanceolate; opposite, to 14 cm long; inflorescence subumbellate; flowers white spotted pink, contorted in bud; fruit a berry; seeds with fleshy ruminant albumen; root yellowish.

Hallucinogen

Ibogaine

Tetrapteris methystica Schultes "Caapi-pinima"

Malpighiaceae

Brazil

Rain forest

A liana; leaves obovate to oblong, 1–3 cm long, light-green above, ash-grey beneath; flowers yellow with reddish markings; fruit a samara.

Hallucinogen

Imperfectly known; probably beta-carbolines

Thea sinensis L. (*Camellia sinensis* Kuntze) "Tea," "Cha"

Theaceae

China, India

Shaded areas

A shrub or occasionally a tree to 10 m; leaves elliptic, 4–10 cm long, leathery; flowers white, usually solitary; fruit a woody capsule.

Stimulant

Theine (caffeine)

Theobroma cacao L. "Cacao"

Sterculiaceae

Central and South America

Forests of high humidity

A wide-branching tree to 9 m; leaves oblong-oval or elliptic-oblong, to 25 cm long; flowers in fascicles on bark of trunk and main branches, small, yellowish; fruit a woody drupe with numerous seeds.

Stimulant

Theobromine (caffeine)

Trichocereus pachanoi Brit. & Rose "San Pedro"

Cactaceae

Ecuador

Mountain slopes

A tall columnar cactus, 3–6 m high, with numerous branches; flowers large, white, 19–23 cm long, borne near the tops of the branches, night-blooming, fragrant.

Hallucinogen

Mescaline primarily

Vaccinium uliginosum L. "Bog Bilberry"

Ericaceae

Circumboreal America and Eurasia

Bogs

Low, dense, much-branched undershrub to .75 m tall; leaves deciduous, elliptic, 3–7 cm long; flowers pink, in clusters of 1–4 from the axils of bud-scales; fruit dark blue or black.

Hypnotic

Unidentified neural toxin

Valeriana officinalis L. "Valerian"

Valerianaceae

Throughout Europe; naturalized in the United States

Damp places, wet meadows, woods, watersides

Robust perennial herb to 2 m tall; leaves compound, leaflets variable; flowers in dense, terminal, flat-topped, branched clusters, pale pink; stamens 3; fruit crowned with a pappus.

Hypnotic

Monoterpene valepotriotes

Vanda roxburghii R. Por. (syn. *V. tessellata*) "Tesselated Vanda"

Orchidaceae

Ceylon, India, and Burma

Epiphytic herb of wet forest

Stem, 80 cm tall; densely leafy; inflorescence suberect or ascending; flowers to 5 cm in diameter, usually with green petals and sepals mottled with brown, lip 3-lobed, violet purple.

Hypnotic; delirium and trance states

Unidentified

Veratrum album L. "White False Helleborine"

Liliaceae

Throughout most of Europe, except Great Britain

In hills and mountains, in pastures and damp grassy places

Robust, erect perennial to 1.5 m tall; leaves numerous, hairy beneath, strongly veined, in whorls of 3; inflorescence a large, branched, elongated terminal cluster; flowers white within, greenish outside, c. 5 cm across, spreading like a star.

Hypnotic

Veratrine and protoveratrine A & B

Virola calophylla Warb. "Epena," "Parica," "Yakee"

Myristicaceae

Colombia, Brazil

Rain forest

A tree to 20 m, dioecious; leaves leathery, oblong, 20–50 cm long, puberulent beneath; branches and inflorescence also puberulent; flowers in fascicles, small; fruit ellipsoid.

Hallucinogen

N,N-dimethyltryptamine and 5-methoxy-N,N-dimethyltryptamine

Withania somnifera (L.) Dunal "Ashwagandha," "Kuthmithi"

Solanaceae

South Africa, tropical Africa, India

Open places, disturbed areas, etc.

A much-branched shrub to 2.5 m tall; leaves elliptic to ovate-lanceolate, 6–9 cm long; flowers in axillary fascicles, small, green; fruit a red berry enclosed by the inflated calyx.

Sedative and tranquilizer

Somniferine

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PHOTOGRAPHY CREDITS

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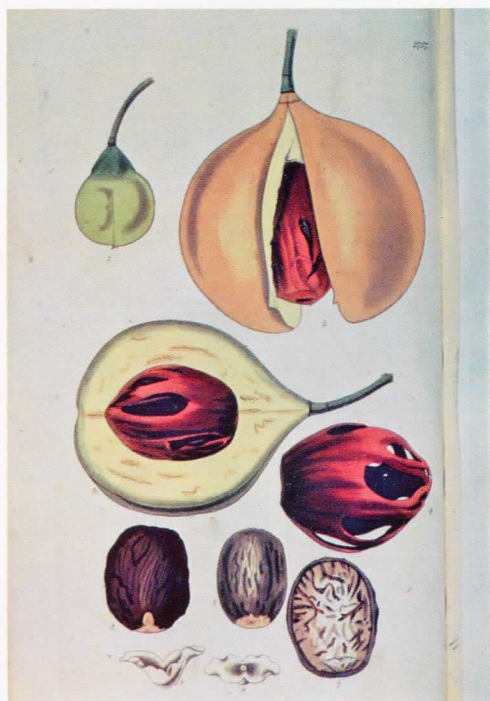


PLATE 17: *Myristica fragrans*



PLATE 18: *Mitragyna speciosa*

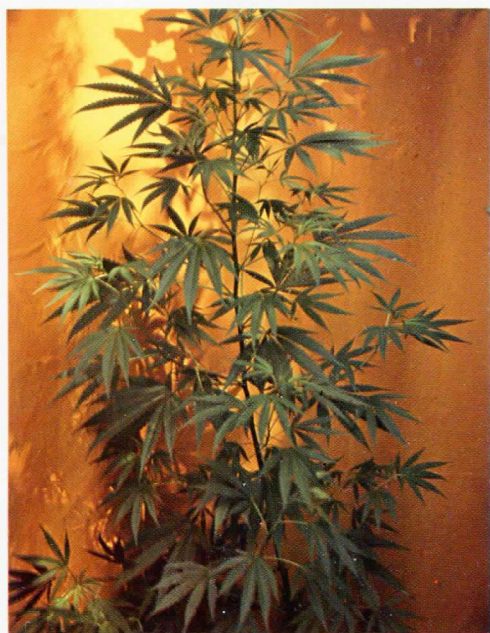


PLATE 19: *Cannabis sativa*

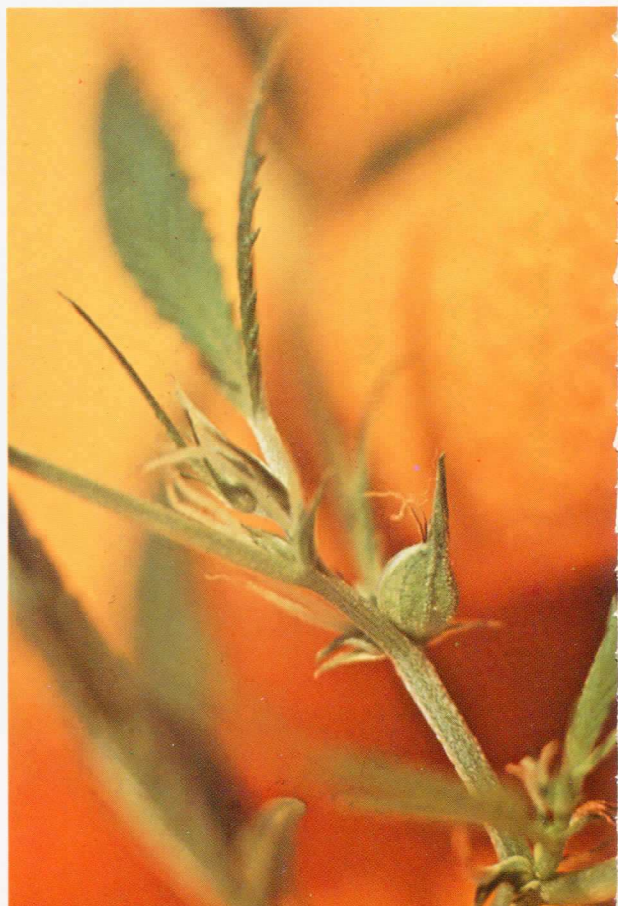


PLATE 20: *Cannabis* female flower



PLATE 21: *Cannabis* male



PLATE 22: *Amanita muscaria*



PLATE 23:
Ephedra trifurca



PLATE 24: *Sarcostemma brevistigma*

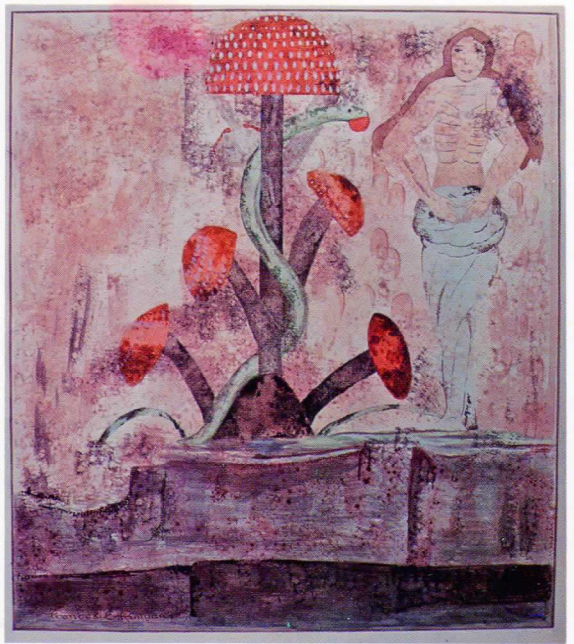


PLATE 25: *Amanita fresco*

PLATE 26: *Kaempferia galanga*





PLATE 27: *Boletus manicus*



PLATE 28: *Leonotis leonurus*

PLATE 29: *Foeniculum vulgare*





PLATE 30: *Catharanthus roseus*

PLATE 31: *Datura inoxia*





PLATE 32: *Mirabilis multiflora*



PLATE 33: *Heimia salicifolia*



PLATE 34: *Lophophora williamsii*

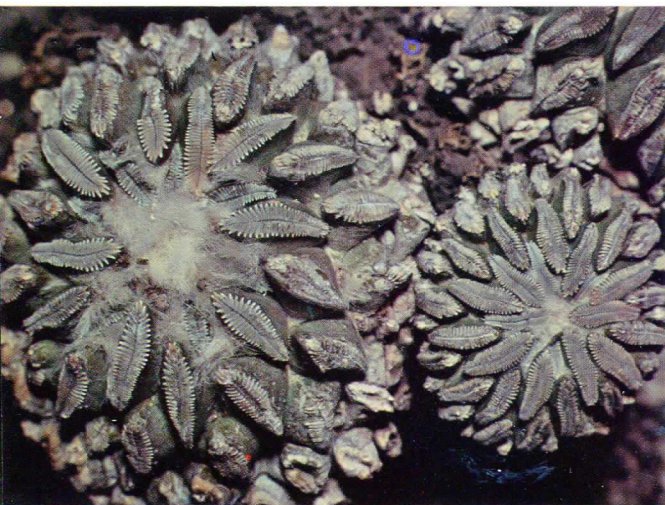


PLATE 35: *Pelecyphora aselliformis*

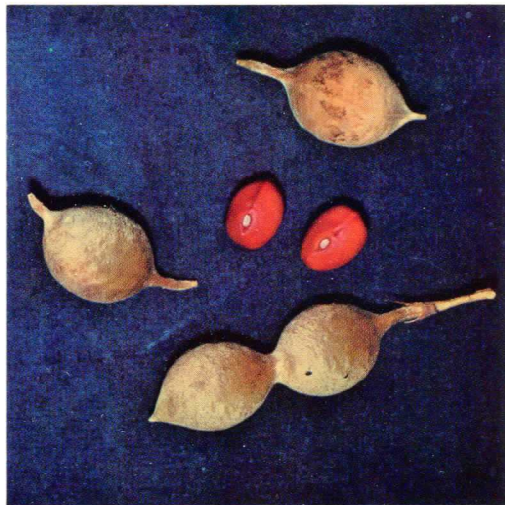


PLATE 36: *Sophora secundiflora*

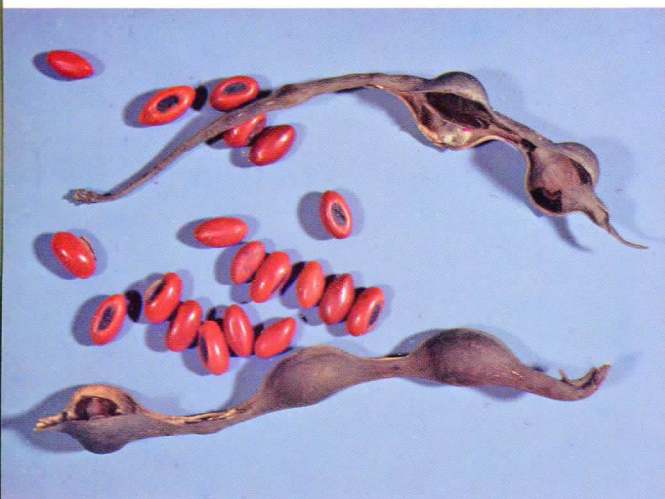


PLATE 37: *Erythrina* seed and fruit

PLATE 38: *Psilocybe cubensis*



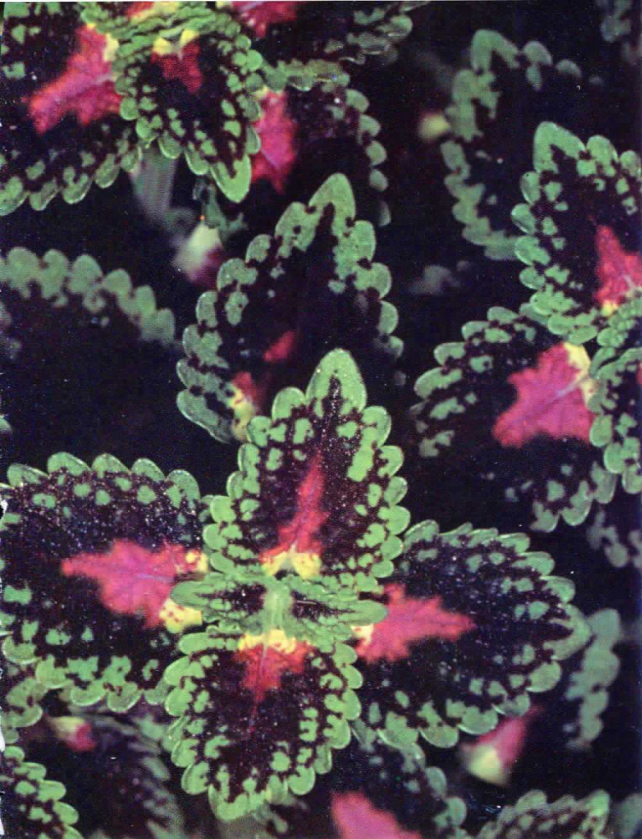


PLATE 39: *Coleus pumila*



PLATE 40: *Salvia divinorum*



PLATE 41:
Ipomoea violacea var. Heavenly Blue



PLATE 42:
Ipomoea violacea seed and capsules



PLATE 43: *Argemone mexicana*



PLATE 44: *Tagetes lucida*



PLATE 45: *Banisteriopsis caapi*



PLATE 46: *Tetrapterys methystica*



PLATE 47:
Brunfelsia grandiflora



PLATE 48:
Methysticodendron amesianum



PLATE 49: *Iochroma fuchsioides*



PLATE 50: *Desfontainea spinosa*

Bizarre Plants

MAGICAL, MONSTROUS,
MYTHICAL



William A. Emboden

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ORCHIDS IN WITCHCRAFT AND MEDICINE

2

*"Within the infant rind of this small flower
Poison hath residence and medicine power. . . ."*

—Romeo and Juliet, Act 2, Scene 3

Lan was the word Confucius used to denote the fragrance of orchids, and he compared this with the company of good men. This mention of orchids, approximately 500 B.C., is among the earliest records of the plant apart from illustrations. These were doubtless terrestrial forms such as the *Cymbidium*, known to the Chinese as *lan hua*, *Bletilla hyacinthina*, or "*Pai-chi*," and another known as *kim-ling-pin*. In Japanese the word *lan* metamorphosed into *ran*, and evidence suggests that both words stood for fragrance, beauty, nobility, elegance, and generally for things of a feminine grace and refinement. Symbolically, to the Japanese the orchid was also emblematic of the virtue of a lonely scholar. This may be attributed to Confucius also, for he is said to have found the *lan* growing among common flowers in a wild valley, an



Bletilla hyacinthina, used
by the ancient Chinese as
a cure for tumors.

allusion to himself as a scholar among the less intelligent and worldly princes of his time.

Scholars who attempt to trace the word *lan* to the writings of the Emperor Shen-Nung dated 2737 B.C. must realize that the figure of this emperor is probably legendary and that *Pen Ts'ao*, in which this reference appears, was not seen in written form until the first century A.D., during the Han dynasty. This classic herbal, as it has been called, could not have appeared at the earlier date, for there was no written language in China at that time. It does, however, reappear in the *Book of Odes*, the *Book of Rites*, and the writings of Huang-ti and Tso-chuan. Later *lan* was used in a broad generic sense to include all kinds of fragrant flowers.

The *Pen Ts'ao kang mu*, compiled between the years 1552 and 1587 by the physician Li Shi Chen, relied heavily upon writings by Ch'en Jen Yü, which dealt with *Cymbidiums* and a limited number of other genera. During the Sung dynasty (960-1279), Wang Kui Lio wrote the *Lan Pu*, and this was succeeded by the *Lan Yen* by Mao Siang. In all these volumes the plant and its products are associated with virtue or with the restoration of virtue. What a different tradition from that of the Western world!

The genus *Dendrobium* has figured prominently in Chinese medicine, and recently a Harvard scholar, Shui-Ying Hu, translated an ancient *Chinese Materia Medica* (Peking, 1960) concerning the medicinal uses of this genus. The Chinese name for *Dendrobium* is *Shih-hu*, meaning "living rock," which refers to the habitat of the genus; this, of course, was interpreted to mean that any medicine extracted from one of these plants would make a man strong and able to withstand the vicissitudes of life. Thus, the stem of *Dendrobium nobile*, ground into a powder, became a staple Chinese drug at an early date, and represents one of the orchids of the *Pen Ts'ao*.

A recent *Chinese Materia Medica* published in Peking in 1960 devotes sixteen pages to the uses of *Dendrobiums* in Chinese medical practice. Investigating these claims, Japanese and American pharmacologists have been finding promising antibacterial and antitumor activity in some of this material. All parts of the plant are sold under the name *Hsien-hu*; a further breakdown into fresh and dry lots and species has resulted in five marketing categories. In most instances the plants are dried after being collected. When dried stems



are sold, they are revitalized at the time of use by soaking pieces of the stem in water and cutting them into sections. *Dendrobium linawianum* contains three alkaloids, one of which has been identified and named "dendrobine."

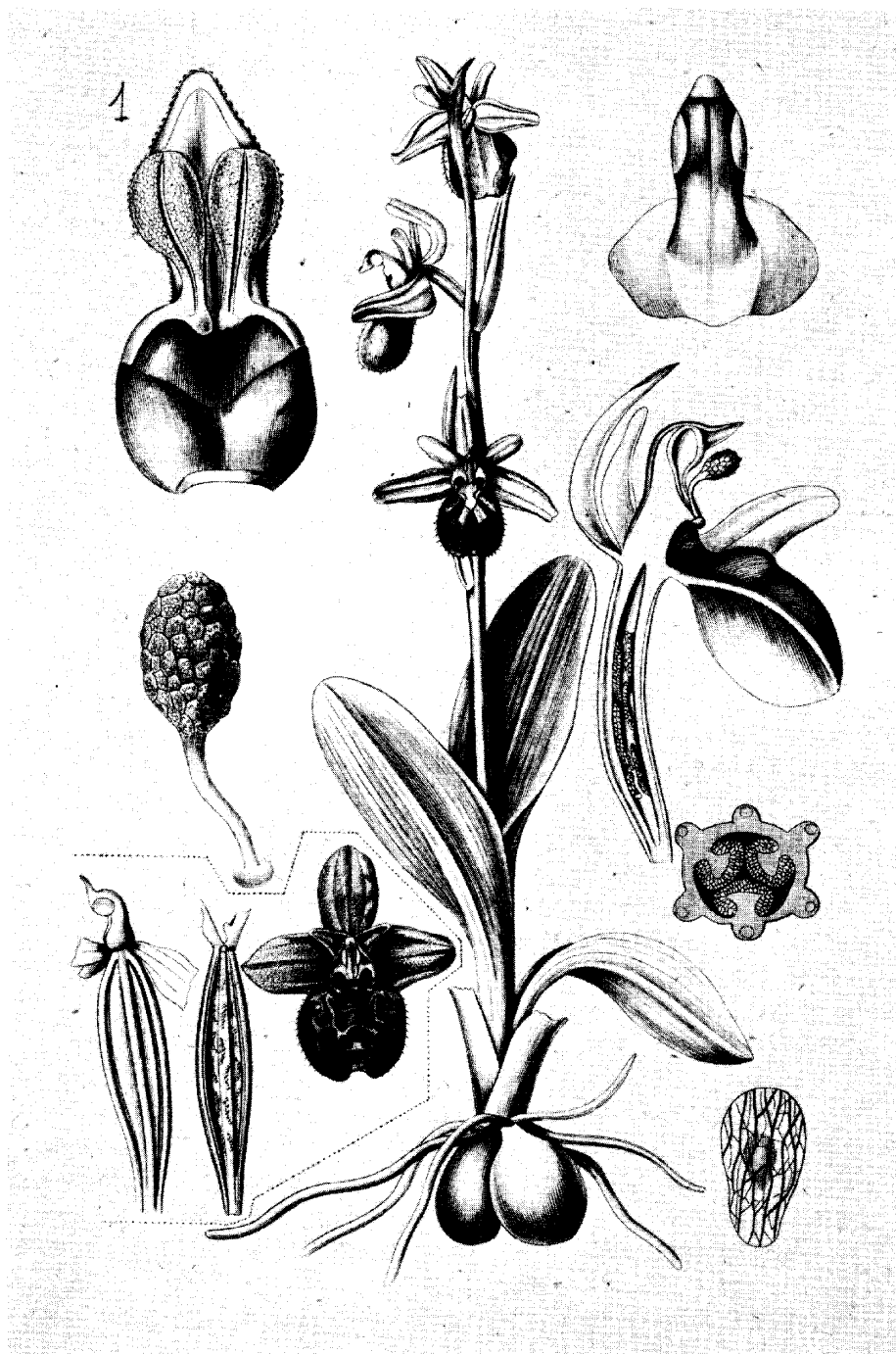
For those involved in the *Yin-Yang* concepts of diet and medicine, the *Dendrobium* medicinals all belong to the Yin category of rather plain, slightly sweet, salty, and cooling herbs. These orchid drugs are said to strengthen the stomach, promote salivation, and increase one's appetite. In cases of fever, thirst, debilitation, and excessive perspiration, the dendrobial drugs are prescribed.

The oldest Greek myth associated with the origin of the orchid has a great deal to do with its subsequent use in witchcraft and medicine. *Orchis* is the Greek word for testicle, an allusion derived from the testiclelike form of the roots of some of the terrestrial species as well as from the cryptic nature of the seeds (proembryos). It was thought that orchids arose where the semen from certain copulating animals or satyrs had dropped to the ground.

Orchis was also the name of the son produced by the questionable relationship between a nymph and a satyr. Being given to his passions, Orchis attended a festival of Bacchus, and becoming drunk on the wine, he seduced a priestess. In a rage the people tore his body to pieces and scattered it. The satyr father of Orchis implored the gods to restore his son to life, but they replied that he had been so intemperate in life that his death was a satisfaction to all. However, the father's plea mollified the gods' decision and they allowed Orchis to spring from the scattered pieces as a flower that should bear his name. Even this was considered a possible error, for from that time it was said that those who ate of the root would be converted to the satyr state of hedonistic pleasures of the flesh.

Jerome Bock (c. 1489–1554) (who assumed the Latin name of Hieronymus Tragus), acting in accordance with the doctrine of signatures, which states that each plant betrays its origins and use in the form of its parts, believed that since the flowers of orchids sometimes resembled bees and, like insects, these plants were born of such insects; he also thought, because of the nestlike mass of roots of other orchid species, that they must grow where birds nest and mate. Athanasius Kircher (1601–1680) spoke of orchids in his

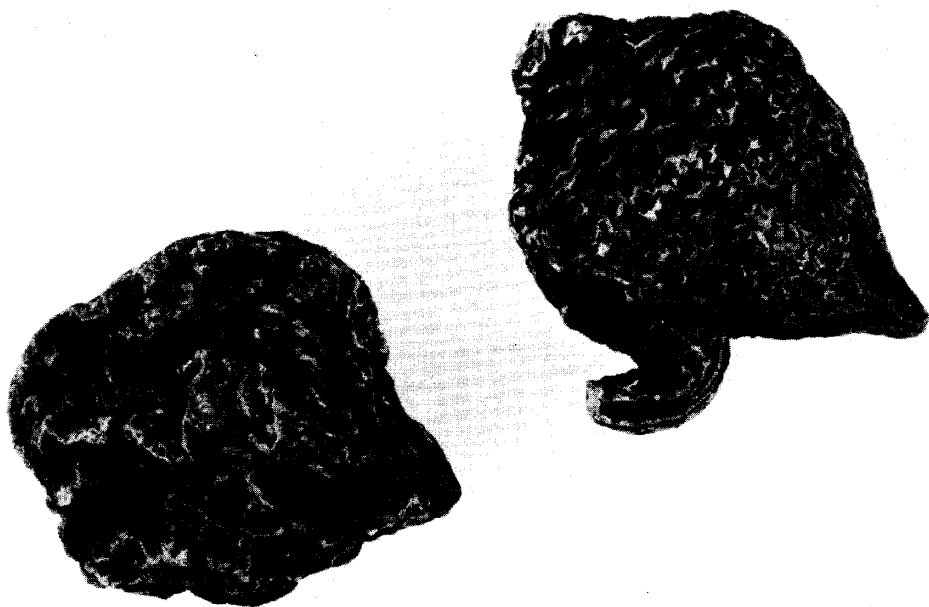
Dendrobium nobile, the
"living rock" used to over-
come all congenital
weaknesses.



Ophrys sp., "the insect orchid."

Mundus Subterraneus under the name *satyria*, thus perpetuating the old mythology. He stated that where animals were brought together for the purpose of breeding, in that ground orchid plants would be stimulated to grow.

It was Dioscorides, writing in the first century A.D., who was responsible for promulgating the mythical use of orchids as aphrodisiacs and love potions, which was repeated later by Pliny. *Cynosorchis* was the plant name used by Dioscorides when he wrote of boiling the larger roots and eating them to beget male children and of eating the smaller root to beget females. He also stated that the women of Thessaly put the softened root into goat's milk to stimulate lust, and the dry root to restrain it. The virtue of one was said to have the ability to extinguish the other. Parkinson wrote in his herbal of 1640 that he had doubts of the specifics, but believed that the firm root was effectual in arousing lust.



Cynosorchis, the
testicular orchid.

The plant of the gallows is generally taken to be mandrake (*Mandragora officinarum*), but to some it was the orchid, for the gallows' plant was said to arise from the seminal effluvia of a hanged man. This legend has its antecedents in the Greek myth of Prometheus, who was bound to Mount Caucasus, where a bird daily devoured his liver. In the process *ichor* spilled to the ground and from this emerged an herb that shrieked and groaned like Prometheus. Going all the way back to the legend of Orchis, it did not seem unreasonable that an herb with a root fashioned like the part of the man from which it came should appear under the gallows. It was the gallows herb that Amelia, in Verdi's opera *The Masked Ball*, is sent to gather at the command of the witch Ulrica in order to restore her lost ardor for her husband.

In the seventeenth century the astrological botanist Nicholas Culpeper affirmed all that had been attributed to the orchid in the way of provoking lust by stating that the orchid was under the dominion of the planet Venus and must therefore be a guide in love. He also believed that a bruised orchid root applied to the proper place would cure "the King's Evil"—a degeneration of the lymphatic glands (scrofula).

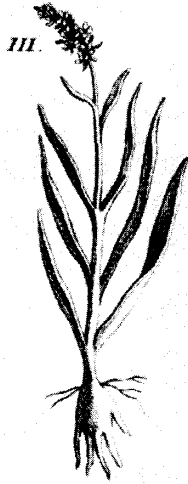
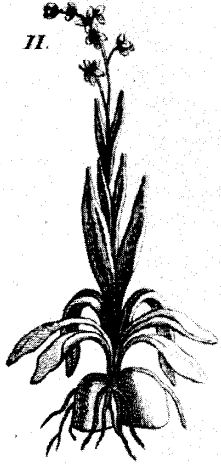
Another botanist of Culpeper's generation, John Gerard, wrote in his herbal of 1597 that orchids known as dogs' stones, being drunk, stirred up "fleshly lust." Those of drier areas have a smaller root and are useful in preventing venery.

Orchis maculata and *Orchis sambucina* were known in old England as "dead men's fingers," "hand orchid," and "*palma Christi*" because the tubers are divided into several fingerlike lobes. This is the same species that Gerard refers to as "Female Satyrion." Shakespeare is referring to *O. maculata* in *Hamlet* (Act 4, Sc. 7) in which Ophelia's death by drowning—Ophelia having first garlanded herself with flowers—is thusly described:

There is a willow grows aslant a brook,
That shows his hoar leaves in the glassy stream;
There with fantastic garlands did she come
Of crow-flowers, nettles, daisies, and long purples
That liberal shepherds give a grosser name,
But our cold maids do dead men's fingers call them.



Platanthera bifolia, or
“dogge stones,” used to
promote venery.



See española de Hist. nat.

Tamara

Left: *Cynosorchis*, a root
for stimulating lust.
Right: "Palma Christi,"
"the hand of Christ."



Orchis sambucina, like
Orchis maculata, was
variously known as
"palma Christi," "hand
orchid," and "dead men's
fingers."

We need not speculate on the name the rude shepherds might have given to the "long purples," or "dead men's fingers"; it was surely drawn from the tradition coupled with the obvious configuration of the root.

Then in an old English ballad the tubers' "fingers" are metamorphosed into a thumb, and the verse is in the following meters:

Then rounde the meddowes did she walke,
 Catching eache floure by ye stalke,
 Such as within the meddowes grew,
 As Deadman's Thumb and Harebell blew;
 And as she pickt them, still cried she,
 "Alas! there's none e'er loved like me."



Orchis maculata.

While fairies are not directly involved in witchcraft, they are often implicated as apprentices to witches. In Shakespeare's *A Midsummer Night's Dream*, Puck is apprenticed to Titania, and as an evil sprite performs various acts of mischief. The elfin changelings of Shakespeare were soulless creatures capable of acts of malice. It was for misbehavior that the witch Sycorax imprisoned Ariel in a pine tree for twelve years (*The Tempest*).

The Reverend H. Friend, who was an authority on literary sources and flower lore, identified the composition of the fairy garland as stitchwort, harebell, wild thyme, and cuckoo-flowers. Looking into this intriguing combination, I found the following sixteenth-century associations with the plants: the stitchwort is of the genus *Alsine*, and was said to be responsible, if plucked, for the transport of mortals to fairy realms; the harebell of England is a wild hyacinth born of the blood of the slain Hyacinthus, beloved of Apollo and Zephyr, hence the flower of grief; wild thyme was said to harbor the souls of the dead, especially murdered people; and the cuckoo-flower is identified as both *Orchis morio* and *Orchis mascula* (*maculata*). The cuckoo-flower was so called because it was said to bloom when the first cuckoo was heard in the spring. Moreover, the fresh tuber of the cuckoo-flower was used by witches in philtres to inspire love and to promote conception. If such a tuber were large, it signified a male child; if small, a female. Dried tubers were indicative of a loss of love and were used to allay sexual appetites and render a person impotent. The curious thing about this garland which the fairies of Shakespeare's day used to subdue and transform mortals is that it is a tradition that may be traced back to the ancients. In Dionysian mythology, Silenus is able to prophesy when he is intoxicated and garlanded by mortals.

The orchid was used by witches in various decoctions to be employed in evil-doing. Certain plants were traditionally associated with the Devil and consecrated to his dark work. Just as his eye is henbane and his intestines bindweed, his hand is *Orchis*. The species in question is probably *Orchis maculata*, for as an alternative to "the Devil's hand," it was known as "Black Mary's hand," Black Mary being the antithesis of the Virgin—the black descriptive of the dark color of the tubers as well as the color symbolic of the Devil. In Germany the orchid *Dactylorhiza incarnata* was known under the name of both *Teufelshändl* ("Devil's hand") and *Teufelsklane* ("Devil's hoof") because of the resemblance of the tuber to

both of these. But in the lore of "white magic," the lady's slipper orchid is consecrated to the Virgin Mary because of the delicate slipperlike labium. This protective "herb-of-grace" was formerly dedicated to Venus, and probably in Nordic traditions to the great female figure, Freya. Herbs-of-grace could be worn, rubbed on the body, incorporated into amulets, or hung in a house—frequently above a mantel.

It is evident to any botanist that the practice of medicine emerged from a tradition that has its origin in witchcraft. The American lady's slipper (*Cypripedium pubescens*) was that herb which the physician John Gent watched "a wanton womans" [sic] gather under the name of dogs' stones. This took place in New England around 1670. Gent maintained that the roots of the plant, when mixed with wine, made an "amorous cup, which wrought the desired effect." This tradition, derived from Europe, implicated orchids in witchcraft as a love potion. However, it was soon evident to a few that the American dogs' stones, differing in both genera and species from its European relative, was somewhat efficacious in relieving nervous disorders and hysteria. As an antispasmodic, it enjoyed some considerable attention by physicians in the early herb medicine practices in this country and was in the *United States Pharmacopeia* as *extractum cypripedii fluidum*. Sold under the name "nerveroot," it soon became known as American Valerian because it had narcotic properties similar to those of the European Valerian, *Valeriana officinalis*. Known also under the name "allheal," *Valeriana* belongs to the family Valerianaceae and is not even remotely related to the orchid known as American Valerian.

Constantine Rafinesque in his *Medical Flora* (1841) wrote of the genus *Cypripedium*:

Of this beautiful genus, all the species are equally medical; they have been long known to the Indians . . . the most efficient is the *C. luteum*. They are sedative, nervine, antispasmodic, etc. . . . They produce beneficial effects in all nervous diseases and hysterical affections, by allaying pain, quieting the nerves and promoting sleep. They are also used in hemicrania, epilepsy, nervous fever, etc., . . . having no baneful nor narcotic effects. The dose is a teaspoonful of the powder, diluted in sugar-water, or any other convenient form.



Details of *Cypripedium
pubescens*.



The roots of *Cyripedium pubescens* produce an effective, though foul-smelling, nerve tonic.

Dr. Charles F. Millspaugh, the famous nineteenth-century American herbalist and illustrator, made note that the observations of Rafinesque "have been fully corroborated in domestic practice."

The *extractum cypripedii fluidum*, which appeared for many years in the *United States Pharmacopeia* as "official," was made from two species: *C. pubescens* and *C. parviflorum*. Millspaugh makes note that in an *Eclectic Materia Medica*, *Cyripedium* was added to *Aristolochia*, ipecacuanha, *Crocus*, camphora, and opium to make *tinctura serpentariae composita*. All these ingredients, with the exception of *Cyripedium* and ipecacuanha, from *Cephaelis ipecacuanha* (an emetic from Brazil), fall into the category of poisons, and yet this mixture in the form of a tincture was thought to be an excellent diaphoretic.

The usual preparation of *extractum cypripedii fluidum* is accomplished by gathering the root in autumn or early spring and reducing it to a fine pulp to which is added two parts (by weight) of alcohol.

This is placed in a well-stoppered bottle and allowed to age for eight days, after which time it is filtered. By transmitted light it gives a beautiful crimson color, but the odor can only be compared to fecal matter and tends to produce nausea if inhaled. Those who have tasted the tincture liken it to black walnut extract and note that it is rather acid. Sometimes the herb gatherers would crush the roots and sell them as a gummy mass under the name *oleoresina cypripedii*. This could be purchased at a lesser price than the tincture for those who wished to compound their own drugs. Millspaugh believed that the usefulness of this plant was only touched upon and that it needed further investigation. He notes that it has a beneficial effect upon the skin, and even more curiously, it quiets hysterical attacks, "especially in women." One wonders if the latter prejudice is not drawn from the association of the flower with women. The generic epithet *Cypripedium* derives from the Greek *Kypris* ("Venus") and *podion* ("slipper"). Common names are *sabot de Venus*, lady's slipper, and *gelbfrauenschuh*. Beyond these allusions there is an obvious resemblance in the saccate conformation of the floral "labia" to female genitalia.

The autumn coralroot orchid, *Corallorhiza odontorhiza* is a peculiar orchid in form and habit. Being a saprophyte, it lives off the decaying remains of other plants much in the manner of mushrooms. Underground rhizomes are elaborately branched in the manner of coral, and the flowering stem arises from a brown naked scape sheathed only by scalelike vestiges of leaves. Purple flowers spotted with crimson terminate the scape. This species occurs in the eastern United States and south to Mexico and Central America. Two names by which the plant is known to natives of the eastern states are "crawley" and "coral," both derived from the appearance of the root. The root, which sometimes looked not unlike that of the orchid rhizome, was gathered by those involved in herb medicine in order to make a tea considered efficacious in various kinds of malignant growths.

Dragon's mouth has become a euphemism for halitosis, but to botanists it is the common name for *Arethusa bulbosa*, the swamp pink. The plant, bearing a single pink flower at the tip of a stem one foot in height, was named for the Greek nymph Arethusa, whom Artemis transformed into a spring so that she might not suffer the passions of a pursuing river god. Perhaps the aquatic environment in which the orchid is found explains the legend, or it may have

Cypripedium sp., whose roots are a source of a female nervine.





Orchis coriophora, from
which salep is derived.



Other *Orchis* sp. tubers
used for making salep.

originated in the beauty of the crimson-streaked magenta and pink flowers with cream-colored bearded lips. Herb gatherers since the eighteenth century have collected the corm of this orchid so frequently that it is now becoming rare in the United States; fortunately, it has a range which extends from northeastern United States into Ontario and Newfoundland. Poultices were made from crushed corms to treat cold tumors and similar degenerative diseases. Japanese medicine has included the use of this corm for toothache, considering it to have narcotic properties.

Over nine different species of orchids have been used as a medicine under the names Salep, Saloop, Sahlep, Levant Salep, and Satyrion. The origin of "Salep" is from the Arabian word *Sahlab*—in Arabian countries it was used as a beverage made from the crushed tuberous roots of several orchid species. These tubers contain a starchlike photosynthate known as bassorin, which has a sweet taste and a delicate fragrance. The English began to import *Sahlep* at an early date from Arabic countries, for Charles Lamb refers

to a "Salopian shop" in Fleet Street, and suggests that the delicacy of flavor exceeds "the Chinese luxury," and with a slice of bread and butter it would make an ideal breakfast for a chimney sweep. While having virtually disappeared from London as a beverage, it still appears in Istanbul as a hot drink.

The English soon found that they had seven native orchids which would serve equally as well as *Sahlep* for making Salep. Soon it was produced in almost every European and Eastern country having orchids. Because of the mucilaginous nature of the bassorin, it was employed as a medicine for the treatment of colitis and diarrhea, and as an easily digestible starchy food for convalescents. Because the dried material swells several times its size when water is added, it was a standard starchy food on all ancient sailing vessels. Bassorin still appears in standard pharmacognosy books as a demulcent, for conditions of hyperacidity, and as an emollient, although it usually is taken from members of the legume family (especially *Astragalus*).

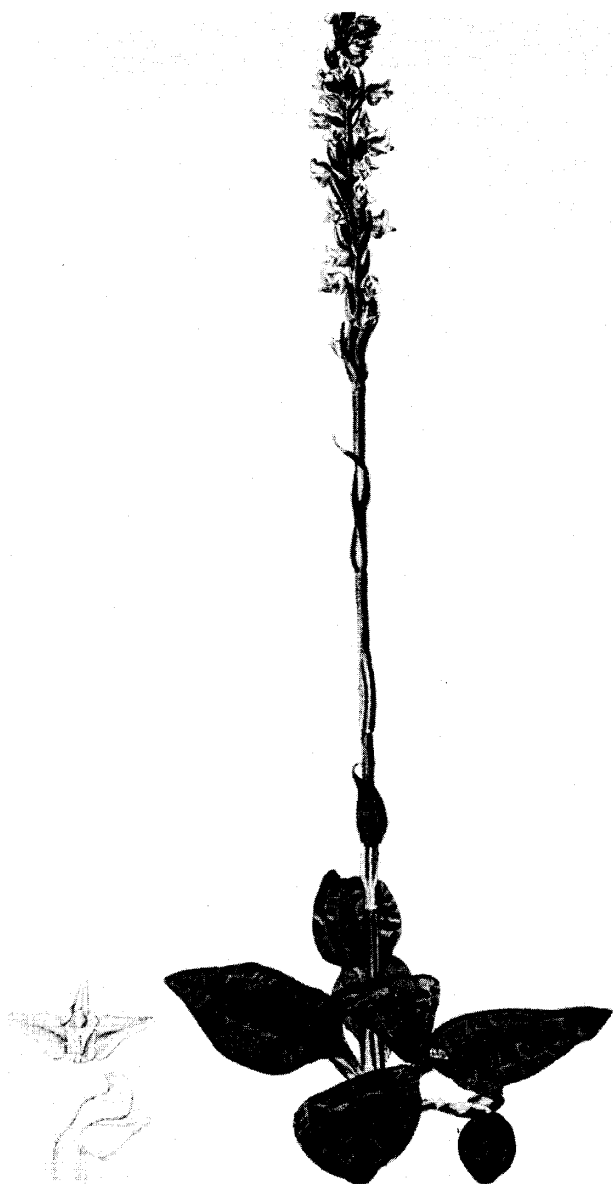
Would the natives of Shropshire, England, refer to themselves as "Salopians" if they realized that the term devolves from *Khusa-al-thalab*, then to *Sahlab*, denoting "testicles of the fox"?

Europeans as well as Asiatics have used the rhizomes of *Epipactis helleborine* to reduce swelling and inflammation of the joints, and now this species has become naturalized in North America, being introduced into our own folk medicine along with *Goodyera pubescens*, which had a considerable reputation for curing diseases of the lymphatic glands. *Laelia maialis* and *L. autumnalis* are both used in Mexico for fevers and coughs. From the south of Mexico through Brazil *Maxillaria bicolor* rhizomes are employed as fever cures. Chile has a native orchid, *Brachystele unilateralis*, which is used as a diuretic, as is *Epidendrum bifidum* in Central and South America; the latter is also employed against internal parasites, much as *Epidendrum auriculatum* is used in India. In Mexico another member of this genus, *E. pastoris*, provides a fine remedy for dysentery, and is sometimes mixed with *E. bifidum* for this purpose. Jamaicans eat the bulbs of *Bletia verecunda* to aid digestion. In the Arabian countries *Lissochilus arabicus* is known in the marketplaces as *dschissab* and is sold as a mucilaginous juice for use in the treatment of open wounds; it is reported to have the properties of a

Laelia maialis, an orchid
used to treat fevers and
coughs.







Goodyera pubescens,
claimed to cure
lymphatic diseases.

Laelia autumnalis. Its
pseudobulbs are also used
for treating fevers and
coughs.

local anesthetic. This is consistent with the Japanese use of *Arethusa bulbosa* as a remedy for toothache, or with the narcotic properties ascribed to *Goodyera pubescens* in North America.

It has been observed that bees visiting the flowers of *Cymbidium devonianum* become so stupified that they fall to the ground in a benumbed state. Such narcotic properties must have had an impact on shamanism in several parts of the world, but the only known instance is the one of the Aurvedic medicine men who are known to have used *Vanda tessellata* and *Ephemerantha macraei* in some medicinal rites involving prophecy and divination.

It is most interesting that people in eastern and southern Africa have beliefs concerning orchids that closely approximate those of western Europe and South America. Again, the overt resemblance of the tubers of numerous genera of orchids to the male testes has led to a common belief that these must have properties rendering them potent in inducing sexual activities. Zulus use the stem of *Ansellia gigantea* as an aphrodisiac, and the Pedi use the roots as a cough remedy. A close relative, *Ansellia humilis*, is made into a leaf infusion, and instead of promoting sexual activity, is said to render a maiden barren; thus it has become a vehicle of sorcerers. A Zulu man will place a small bit of the leaf under his arm ornaments as a talisman to aid him in his courtship. This same species, used as a stem infusion, is said to expel bad dreams; inhaling a smouldering root will expurgate madness. *Lissochilus arenarius* roots are said by the Zulu to be the most powerful means of overcoming barrenness in women, and will serve a man well in acts of love. In Nyasaland the Nyanja cook these same roots for use as a poultice. *Lissochilus dilectus* roots are brewed into a decoction which the Congolese believe to be efficacious in treating scabies and almost any other skin lesion. *Lissochilus krebsii* is popular among the Swati as a cure for disease of children, and elsewhere it serves as a sedative. Lobedu men use several species of *Lissochilus* as an aphrodisiac; this effect is said to be achieved by chewing on the stems.

Eulophia flaccida has tubers which are burned, and the resultant ash is rubbed into incisions made on ailing limbs. Several species of *Eulophia* are used in South Africa during periods of protracted illness. Three species—*E. robusta*, *E. hians*, and *E. flaccida*—are given to barren women until they conceive, and this philtre is continued until four months after conception is manifest.



Vanda tessellata, used in
Vedic prophecy and
divination.



Alimentary ailments are often treated by inducing vomiting via root infusions of *Habenaria foliosa*; then *Herschelia venusta* or *H. barbata* tubers are used as a nutrient because of their digestible starch and mucilage. Four species of *Satyrium* native to Africa are used in the same manner: (*S. bicornis*, *S. candidum*, *S. carneum*, and *S. erectum*). All are nutritious and digestible.

The curious history of the uses of orchids is really a synoptical sketch of the evolution of magic into medicine or of the origin of many medical traditions. Only recently it was discovered that both tranquilizers and birth-control agents have histories rooted in folk traditions. Perhaps some enterprising pharmacologist will conduct an ethnobotanic survey of some of the bizarre traditions connected with orchids, and find equally interesting chemical attributes in these, the most beautiful of flowers.

Satyrium carneum, whose name celebrates the satyr ancestry, is another orchid used in making salep.

A Select Bibliography

Due to the inaccessibility of books from which the author has derived much of the information contained in this volume, they are not listed in this bibliography; rather, it was deemed appropriate to list only those volumes to which the reader might have access.

I am indebted to the Huntington Library of San Marino, California, for those rare volumes which they so generously made available to me.

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Bizarre Plants

MAGICAL, MONSTROUS,
MYTHICAL



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SATAN'S SIMPLES:

The Herbs of Black Magic

3

*" . . . mixture rank, of midnight weeds collected,
With Hecate's ban thrice blasted, thrice infected . . . "*

—Hamlet, Act 3, Sc. 2

As interest in the occult proliferates, witches' covens are established, black masses are said, and Satan-worship grows, a concomitant interest in those herbs consecrated to Satan or those over which he has dominion is manifest. Numerous malefactions and incantations require specific plants in order to be efficacious, and these are once more being cultivated to that end. Within walking distance of my home, a shop for sorcerers, witches, and warlocks is thriving. Passing by a guardian raven and owl, both quite alive and looking as attentive as Cerberus at the gate of Hades, one encounters plaques of fetishes—talons, scarabs, dried bats, bones, desiccated toads—and a curious array of apothecary jars filled with gums, roots, leaves, stems, and dried flowers in such profusion as would astound a botanist and delight a

warlock. Indeed the black arts are flourishing. Inspecting these bizarre forms row upon row, one has the feeling of being in the *sanctum sanctorum* of a cathedral on a tour of reliquaries, with the dried fingers and bones displaced by equally curious contorted roots and clots of bloodlike resins. If des Essientes, that anomalous creation of Huysmans, had had any business proclivities, he would have luxuriated in this Satanic citadel. The custodians, quite anachronistically, more closely resemble a Botticellian cherub pressing on to his majority and a nymphette possessed of an outrageously beautiful face. Gone the sinister malefactor of gaunt visage and angular frame; gone the crone and hag of yesteryear. The witches and warlocks of the moment seem to take an impious delight in re-creating the formulas, spells, and potions that were associated with a sinister history. Curiously, most of these aspiring disciples of Satan know little or nothing of the plants and plant products that they sell, and even less of the botanical mythology that surrounds them. Perhaps, then, it is time to open the demesne of Satan and to reveal the garden which the writer John Ingram once described as a damp and humid place where hideous reptiles and birds of ill omen congregate, "and plants and weeds of noxious properties do thrive; and where the wizened wizard and the shrivelled hag of face repulsive might most fitly perform their incantations . . . amid the mouldering bones and decayed coffins."

A beginning for such a lurid chronicle should consider the plant most dear to Satan, the enchanter's nightshade (*Atropa belladonna*), which the Greeks consecrated to the powerful Circe, an enchantress who could change the mortal aspect of men and reduce them to swine. Satan is said to guard the nightshade with an unflagging devotion, except on *Walpurgis nacht* (April 30) when the witches' sabbath is celebrated, or on an uncertain night when he may be drawn from the herb by a black hen that he cannot resist pursuing. Then one may gather the herb and make the Devil do his bidding. The dusky violet-green flowers had a "dismal aspect" in the eyes of the astrologer-botanist Nicholas Culpeper, and other seventeenth-century botanists admonished the wise to banish it from their garden. Interestingly, the herb has in all its parts alkaloids potent enough to induce delirium and even death. Doubtless the delirium was accompanied by hallucinations of flight induced by scopolamine,



one of the many active materials in the herb. Thus, from the Devil's own herb witches fly!

Would you harbor any of these noxious plants within your own walls? Doubtless you do; the Devil's garden may be your own. His signature is read in the leaves of parsley (*Petroselinum sativum*) common to every table. Because this plant must visit with Satan nine times before it sprouts, and the Devil takes his share, the ancients were awed by it. Plutarch tells of an army prepared for battle fleeing at the sight of an ass bearing parsley. Grecian tombs were bedecked with this herb of death. A man in need of parsley was a man close to death in the lore of ancient Greece, and a witch procuring parsley could engender abortion in an unsuspecting girl; however, in European lore a girl who sows parsley will be impregnated by Satan while she sows. When the male head of a household plants the herb in abundance on Good Friday, the Devil may thus have his share; and in a rising moon, the herb will grow without malefaction. But, if transplanted, parsley will bring the downfall of an entire household.

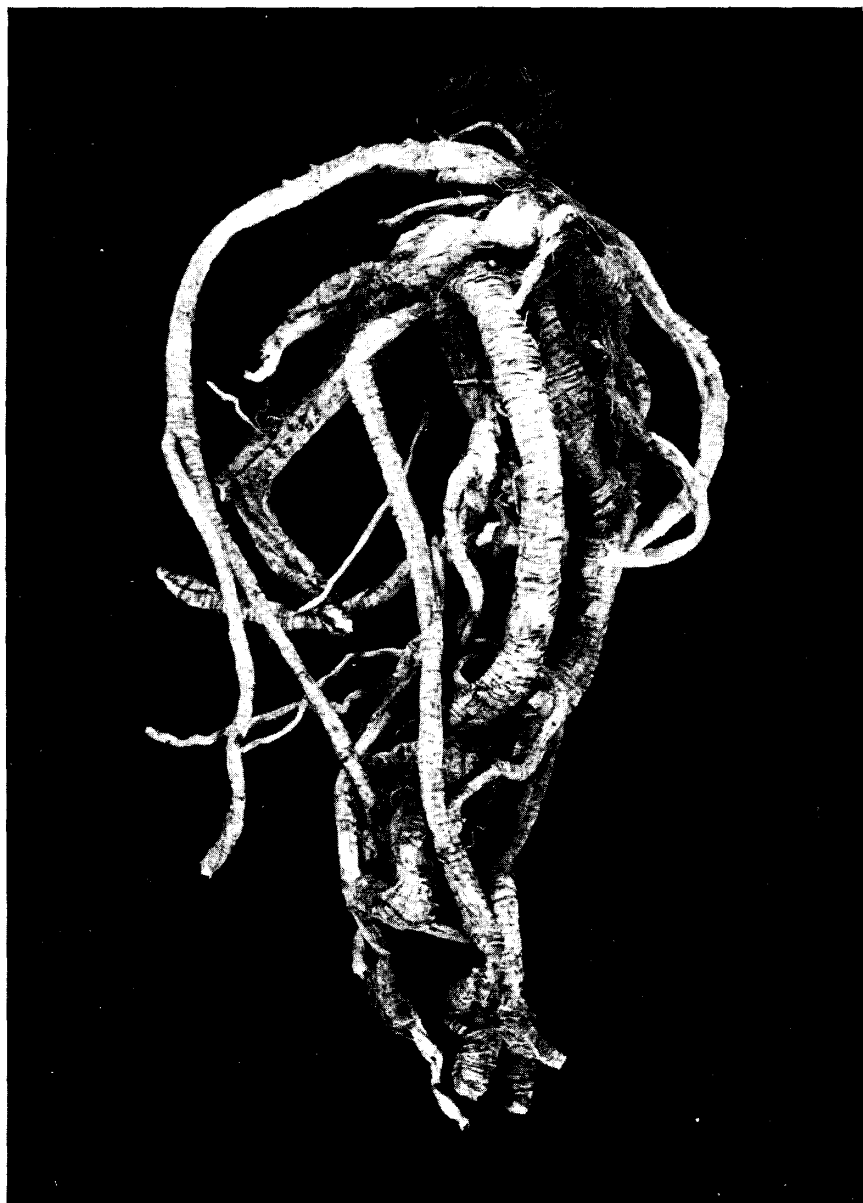
Recent investigations into the oils of parsley indicate that they may be potential precursors of amphetamines by liver metabolism. Could some distiller of an early date have procured Satanic visions from this herb?

Contrary to an early Hindu legend, which asserts that the plants of the world held consul and agreed to fight the Evil One by serving as antidotes to all of the pestilence spread by his animal conspirators, Western traditions have looked upon some plants as being in the service of Satan, and others as beneficial in combating the Devil's forces. Beyond asserting that Satan's favored plant is the deadly nightshade and that his signature is parsley, a doctrine developed in western European mythology that the body of Satan was comprised of several malevolent herbs. The feces of Satan are expressed in the root of the umbelliferous assafetida (*Ferula assafoetida*), which has such a peculiar stench that it was used in talismans to ward off evil, a seeming contradiction. His eye, as we learned earlier, is henbane, (*Hyoscyamus niger* or *Hyoscyamus aureus*), the flower of which has the aspect of an evil eye. His beard is snapdragon (*Antirrhinum* sp.), which resembles both a mouth and bearded chin. The hand of Beelzebub consist of claws of *Lotus corniculatus*, which has clawlike fruits, and *Ranunculus arvensis*, which is possessed of clawlike tubers. The

Atropa belladonna
(enchanter's nightshade)
is consecrated to Circe
and guarded by Satan.



Ferula assafoetida.



The foul-scented root of *Ferula assafoetida* is Satan's feces, yet paradoxically it was used as a talisman to ward off the Evil One.



orchid *Gymnadenia conopsea* has also been claimed to be the Devil's hand. Field bindweed (*Convolvulus vulgare*) twists around other plants in an intestinal fashion and has become known as "the Devil's guts," along with the parasitic species of dodder (*Cuscuta* sp.). Satan's foot, or cloven hoof, is another orchid (*Dactylorhiza incarnata*). Less frequently mentioned are the Devil's testicles, which are the fruit of the mandrake (*Mandragora officinarum*); and his "member," a fungus which bears the less euphemistic name of *Phallus impudicus*, or stinkhorn. It is said that Satan sows crops of corn cockles (*Lychnis githago*) and the fungus, ergot (*Claviceps purpurea*); the former is a great pest of crops, and the latter, sometimes called darnel, is responsible for the dread St. Anthony's fire. The spittlebug, which throws a bubbly mass of salivalike material



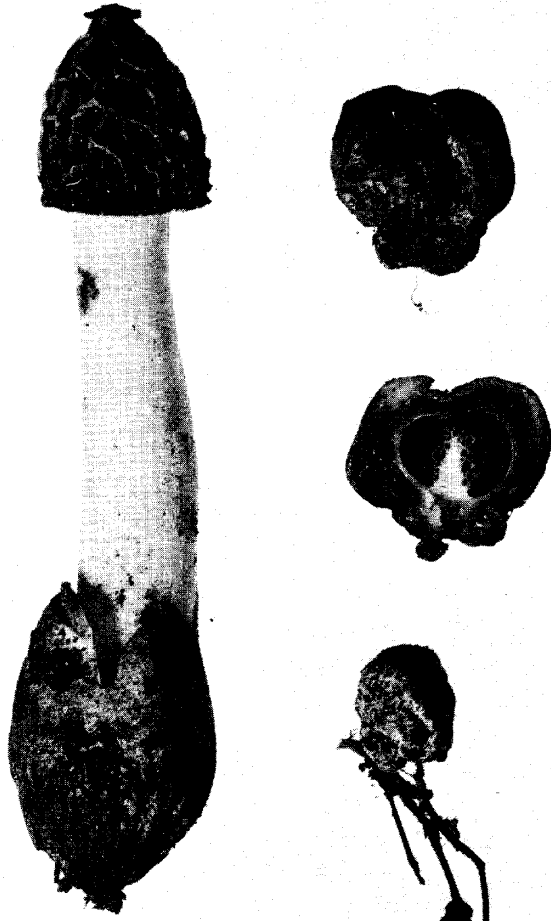
Cuscuta sp., "the Devil's guts."

Hyoscyamus aureus
(henbane), or "the
Devil's eye."



Mandragora officinarum,
showing fruit ("the
Devil's testicles")
and flowers.

around itself, has given rise to the myth that Satan spits on blackberries (*Rubus caesius*) in order to possess those who would eat of them—after October first! Infuriated with the plant *Scabiosa succisa* because of its value in curing a host of man's ailments, Satan is said to have chewed on the root, leaving his teethmarks; hence the name "Devil's bite" for this herb. For his own purposes he used snuff from puffball fungi (*Lycoperdon* sp.), milk from the poisonous spurges (*Euphorbia* sp.), nettle (*Urtica urens*) for a needle, clematis (*Clematis recta*) seed hairs for thread, and indigo (*Baptisia tinctoria*) for a dye. Where his left foot touched soil outside the Garden of Eden, garlic (*Allium sativum*) sprang up, and his right foot gave rise to onions (*Allium cepa*). Evildoers are hanged on oak trees (*Quercus* sp.), and each of these then becomes



Phallus impudicus,
(stinkhorn fungus), or
"Satan's member."

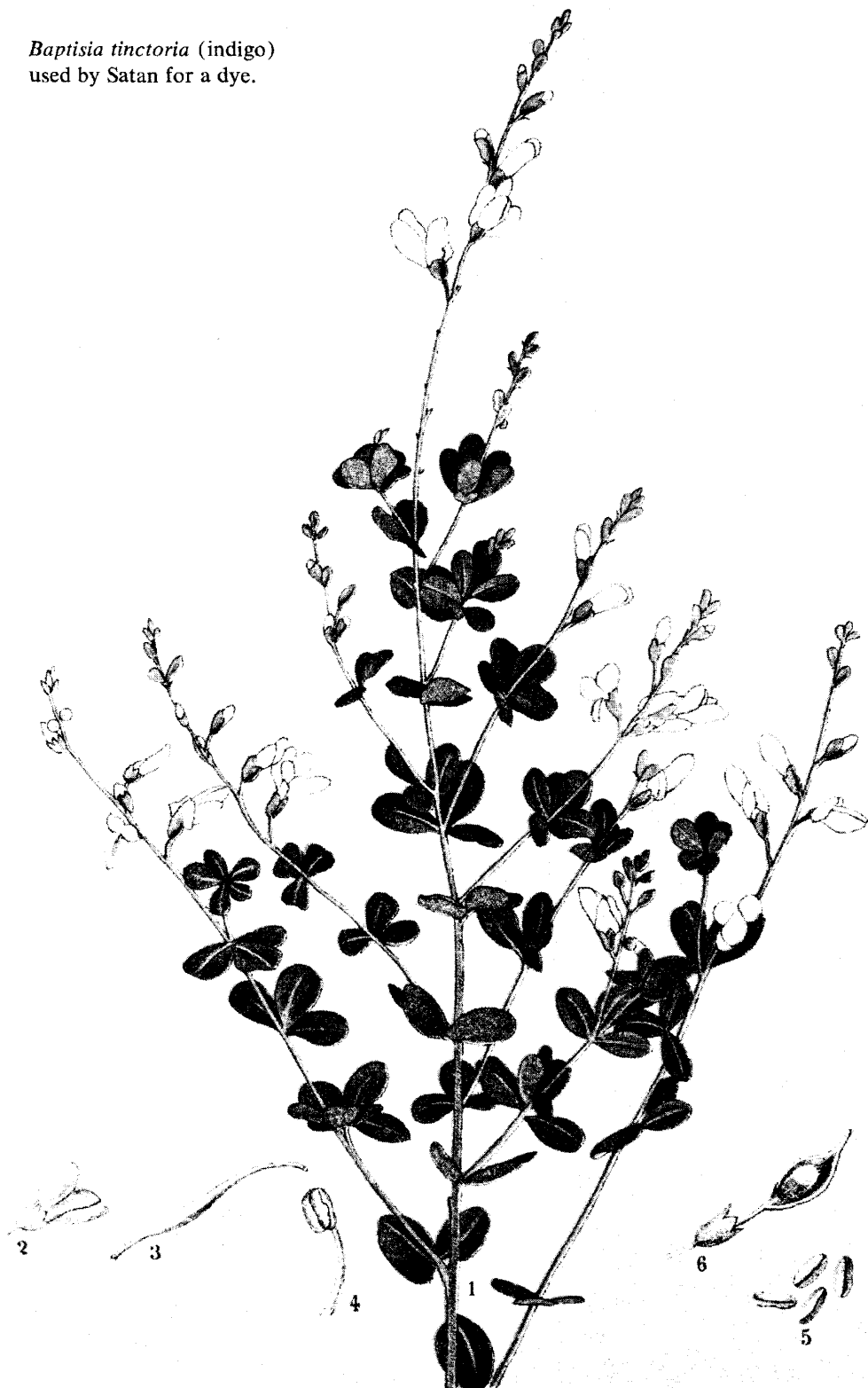


Calvatia gigantea, "the
Devil's snuffbox."

the Devil's property. For this reason, the mandrake is said to grow beneath oaks. His smoke arises from the ground as fumitory (*Fumaria officinalis*), and at night his candles of mullein (*Verbascum thapsus*) may be seen ablaze. Apart from the aforementioned, we must delve into the plants that figure prominently in specific spells, potions, and philtres used by Satan or his agents.

Among the ancient Greeks the narcissus (*Narcissus poeticus*) was said to be the corona of Dis as well as of the Furies, for the scent of narcissus is so strong that it is overpowering in an enclosed area. The generic name is derived from the Greek *narke*, meaning "stupor," from whence we have devolved the term "narcosis." Although Dis,

Baptisia tinctoria (indigo)
used by Satan for a dye.

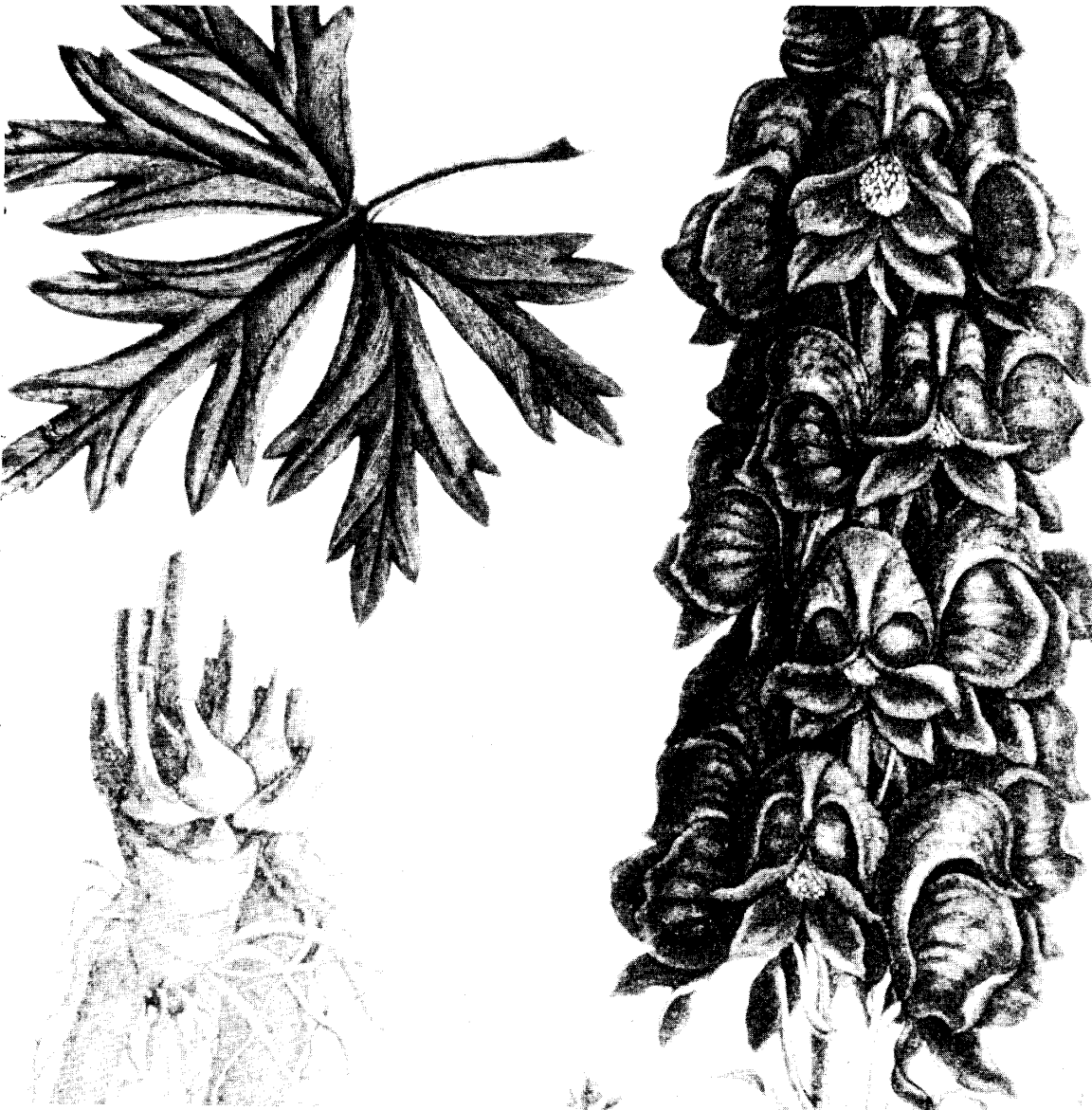


Fumaria officinalis, the
"groundsmoke" of Satan.



or Pluto, god of the underworld, might be crowned with narcissus, the Greeks also adorned their dead with the powerful flowers to ward off evil spirits—a seeming contradiction. This civilization also knew of the deadly wolfbane (*Aconitum napellus*), a plant they believed to have arisen from the foam of the mouths of Cerberus while he was under the influence of Hecate, goddess of the underworld and magic. Not only was this herb poisonous, causing irregular

Aconitum napellus is
under the dominion of
Cerberus and Hecate.



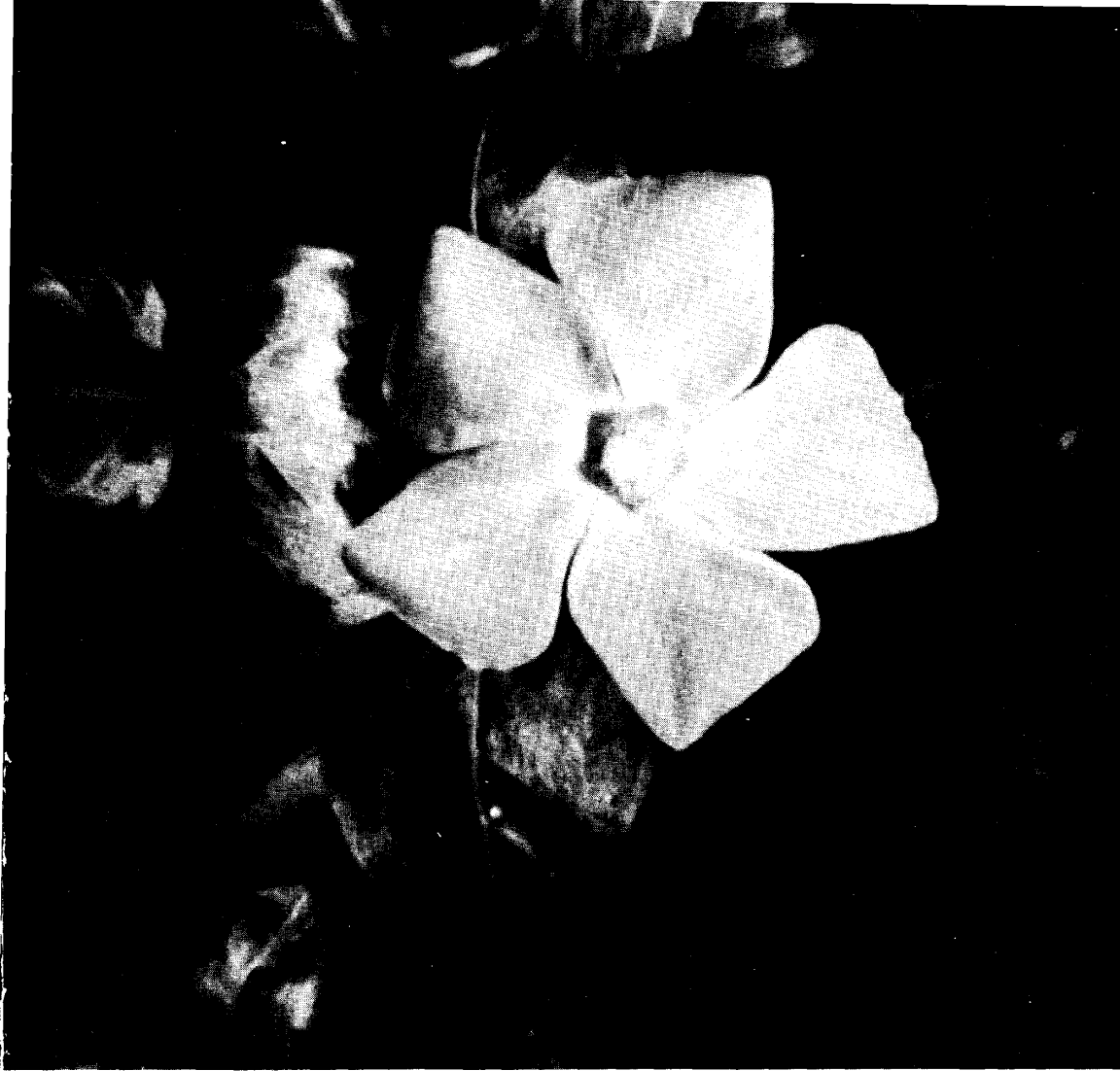
heart action, but, along with the deadly nightshade, it became an essential ingredient in witches' flying ointment. These plants, as well as cinquefoil (*Potentilla reptans*), smallage (*Apium graveolens*), and wheat flour mixed with the fat of a stillborn child, were applied to the labial passages by means of anointed broomsticks. This gave the sensation of flying, which is associated with the witch, due to the scopolamine content of henbane.

Satanic figures and witches are reputed to have the ability to make themselves invisible; this is accomplished, according to an old French legend, by uprooting black hellebore (*Helleborus niger*) and reducing it to a powder which, when scattered, is said to render men incapable of being seen. It was of special importance to witches so that they would not be seen flying through the air.

The French have another flower closely associated with sorcerers, the common periwinkle (*Vinca minor*), which they called "sorcerer's violet." This diminutive liana bears contorted blue-violet flowers that to the Italians are the "flowers of death," a tradition known in medieval England as well, for condemned men were forced to wear garlands of periwinkle on their way to the gallows. The oak tree has already been mentioned as a gallows tree, but it is only one of several which are the province of the Evil One.

Walnut trees harbor evil spirits in their branches, and while walking beneath them, one hears unclean things that will inspire a populace to hostilities and scandalous behavior. In Benevento, Italy, the gibbering servants of Satan nested in a walnut tree and allegedly caused the people of this city to indulge in obscene behavior that prompted the Emperor Constantius to issue an edict against their lascivious conduct; however, St. Barbatus identified the local walnut tree (*Juglans nigra*) as the source of this scandal, and he ordered it felled. As the tree fell to the ground, St. Barbatus spied a serpent escaping from beneath it; he hastily sprinkled it with holy water, whereupon Satan himself was revealed. Also, in Rome, a walnut tree spreading similar scandal was cut down; after the rites of exorcism the ground was reconsecrated and upon it was built the church of Santa Maria del Popolo.

The fruit of the walnut tree serves to identify those who are under its powers. If a woman is suspected of being a witch, a walnut dropped into her lap will prevent her from arising from a chair. Virtuous persons need have no fear of the walnut tree, for



Vinca minor, "sorcerer's
violet."

it is recorded that St. Agatha crossed the Mediterranean from Catania to Callipolis in a walnut shell! Such a feat makes space walks seem inconsequential.

Willows have a dread history of association with witches and demonic powers, for in antiquity Circe hanged the least of her suitors in a grove of willows. In Europe the willow was believed to have been planted by Satan to lure suicide victims to its watery habitat. It is said that the willow begets serpents, probably due to

the serpentine red roots seen in the waters in which it is found growing. Witches traditionally go to willows to forswear God and all things that are holy. It is there that daughters of Satan inscribe their names in blood in the Devil's own book. Kundry, who laughed at Christ on the cross, had to wander the earth without the comfort of tears, and could find solace only in a grove of weeping willows. The French were certain of these legends when Napoleon I died, for on the eve of his death, the willow under which he had sat contemplating his fallen state, was uprooted by a storm. Is it any wonder that Orpheus descending into Hades took a willow wand to protect him against the evil powers?

40



Tilia vulgare, the
magic leaves of the Scythian
soothsayers.

When the ancient Scythians sought prophetic judgment, they consulted their soothsayers (shamans), who went to a linden tree (*Tilia vulgare*) and twined its leaves about their fingers. By so doing, the linden spoke to them. Was this the voice of dark spirits?

In the peculiar thirteenth-century volume on sorcery, *Le Petit Albert*, we find fifteen magical herbs of the ancients listed; it is a rogues' compilation and has nothing to do with antiquity. Customers for such occult knowledge desired to know the secrets of the Egyptians who, they believed, possessed the mysteries of alchemy and witchcraft. Thus, among these plants we find listed Isiphon of the Chaldees, which is centaury (*Erythraea centaurium*); in an English translation of 1619 it is said:

. . . this hearbe hath a marvellous virtue, for if it be joined with the blood of a female lapwing or black plover, and put with oile in a lamp, all that compass it about shall believe themselves to be witches, so that one shall believe of another that his head is in heaven and his feete on earth; and if the aforesaid thyng be put in the fire when the stars shine, it shall appeare yt the steeres runne one agaynste another and fyghte.

Such visions may be induced to the advantage of one who is not afraid to call upon Satan for love divination. If a young maiden is very brave, she may use one of the Devil's plants to her advantage. Should she desire to see the form of her future husband, she must obtain seeds of the butterbur (*Petasites vulgaris*) and sow them a half an hour before sunrise on a Friday morning in a place known but to her; as she scatters the seed, she must repeat the following stanzas:

I sow, I sow!
Then my own dear,
Come here, come here
And mow, and mow!

As the seed is scattered she must look up, and in the distance she will see the form of her lover-to-be. Should she lose her temerity and call out "Christ have mercy upon me," she will also lose the vision.



Sambucus nigra, an elder
whose wood is the home
of witches.

The disciples of Satan, the witches, make their abode in certain plants and do not respond favorably to being disturbed by mortals. In most Scandinavian lore the elder (*Sambucus nigra*) is the home and prison of witches, and the wood is possessed of demonic spirits, so that anyone who is dastardly enough to cut the tree for furniture will be haunted and tormented for life. It is said that the branches woven into cradles are so diabolical that the child ensconced in these arms of Satan will have his legs pulled and suffer great torment. Should a child be switched by an elder branch, he will cease to grow. If a man falls asleep under an elder, he will have visions of hell and will suffer much anguish.

Since the moon is thought to have a great influence on the behavior of men, and those so possessed are denoted lunatics, it was a practice of the ancients to look for the signature of the moon in herbs so that they might be avoided. Moonworts were several species of plants said to be employed by Satan, witches, and necromancers in their evildoing. *Botrychium lunaria* and *Lunaria annua* were both moonworts, the former shaped like a crescent moon, and the latter having silver moonlike fruits. Horses who trod upon such herbs were said to lose their shoes; and evildoers could use the plants to miraculously open locked doors.

Among the most savory herbs of most gardens is the sweet basil (*Ocimum basilicum*), for which most gardeners and gourmets have nothing but praise—this was not always so, for as early as the Middle Ages it was recorded that the basil is mutable and not to be trusted. It may change its form to that of the wild thyme, and Hilarius swore that a friend of his bred a scorpion in his brain by inhaling basil. Buried under horse manure it was said to change into a host of venomous creatures. John Keats, who was so enamored of things Italian, brought this tradition into the nineteenth century when he transposed the story in Boccaccio's *The Decameron* concerning the pot of basil. Isabella was so grieved when her brothers murdered her lover that she took his head and put it in a pot of basil in her room. Every day she could be found watering the basil with her tears. Such behavior is not only beyond the pale of romanticism, but leads one to question whether or not Isabella had a scorpion in her brain.

Hemp (*Cannabis sativa*) produces a narcotic resin as well as a sturdy fibrous cane. In China these canes were used to drive evil





Ocimum basilicum, an
herb that bred scorpions
in the brain.

Lunaria annua has the
power to unshoe horses
that trod on it.



Achillea millefolium,
 "the Devil's plaything."

Dracunculus vulgaris celebrates
 the dragon, which is
 Satan.



from the bed of a sick man, while the fibers were used for weaving a durable cloth and in making cordage. However, in England, hemp has the traditional role of providing the broomstick upon which witches ride. This devilish tradition may harken back to the Scythians who used the branches and leaves in their funeral customs.

Even the Devil must have his fun, and the herb which aids him is *Achillea millefolium*, often called "the Devil's plaything," or "Devil's nettle." "Bad man's plaything" was another name used to indicate its employment by those in Satan's power who would use the feathery leaves in divination and spells. A heady scent emanates from these leaves, and if a leaf inserted into one's nostrils and twisted caused blood to flow, he might then be prophetic in several areas, but especially in that concerning love. To this end the leaf was sometimes wrapped in a piece of flannel and placed under a pillow. If the dream thus begotten should be one of cabbages, it was a certain portent of a great disaster and possibly death.

Because St. John the Divine informed man in his Revelations that the Devil, Satan, "that old serpent," and "the dragon" are one (Rev. 20:2), plants which bear the name "dragon" or "serpent" usually play a role in demonic tradition. *Draconitum draconis*, *Dracena draco*, and the genus *Dracunculus* all celebrate the dragon, which is Satan, and all have figured in spells and witches' incantations.

With the prevalence of herbs under the dominion of Satan, and the proliferation of covens of witches and warlocks, what can one do to avoid becoming a victim of such evil? Fortunately, there are more plants used to arm oneself against such malefactions than there are evil herbs, and ironically some of the same herbs are found in both traditions! Certainly this calls for an exposition of these botanical benefactors, or as they are better known—herbs of grace.

A Select Bibliography

Due to the inaccessibility of books from which the author has derived much of the information contained in this volume, they are not listed in this bibliography; rather, it was deemed appropriate to list only those volumes to which the reader might have access.

I am indebted to the Huntington Library of San Marino, California, for those rare volumes which they so generously made available to me.

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Bizarre Plants

MAGICAL, MONSTROUS,
MYTHICAL



William A. Emboden

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HERBS OF GRACE:

Witches and Warlocks Undone

4

*"For flying things,
Mighty against loathed ones,
That through the land rove."*

*—From the Lacnunga of the Middle Ages,
"On the Uses of Achillea"*

Charms, amulets, and talismans, used to ward off the evil of necromancers, were often precious or unusual stones, but just as frequently they were pieces of root, leaves, bark, gum, or dried flowers from plants consecrated to such a purpose. The Archangel Michael, little known beyond his single great accomplishment of warring successfully with Satan, is commemorated botanically in the herb which is most potent against all forms of witchcraft—*Angelica archangelica*. So named by Linnaeus, *Angelica archangelica* was said to bloom on the day of St. Michael the Archangel (May 8, in the earliest traditions), and every part of the plant is reputed to be efficacious as a safeguard against evil. The root, however, was held in especial esteem and as such was called "the root of the Holy Ghost." Looking like



Geum urbanum (*herba benedicta*). Its root offers protection against "venomous beasts and evil spirits."

a giant parsnip, this umbel has fragrant leaf stalks that are now often candied and given to children—to what end?

Another herb also bearing a holy name is *herba benedicta* (*Geum urbanum*). This diminutive plant is named in honor of St. Benedict, who was a great warrior against Satan. Once when Satan, in the mortal guise of a monk, offered the good saint a goblet of poisoned wine, St. Benedict blessed it, and the Devil burst forth from the wine with such force as to shatter the glass. Thus the root of this herb was often worn about the neck in a small cloth bag or carried in the pocket to ward off "venomous beasts and evil spirits." Called "colewort" by the British, it was kept in houses to protect them from harm. De Cuba, in 1491, stated: "Where the root is in the house Satan can do nothing and flies from it." This author stated that "it is blessed before all herbs."

In earlier times holy water in Catholic churches was scattered upon believers by dipping a sprig of rue (*Ruta graveolens*) in the consecrated water. This tradition of employing the vile-scented grey-green rue plant is taken from a practice of the ancients in which rue was the most potent antimagical herb—especially against evil brought to a village by strangers. The herb, whose name is derived from the Greek stem *reuo*, meaning "to set free," was professed to free one of any illness, including poisoning. The ancient Greeks made an anointing oil of a philtre of rue juice and nine drops of dew from moonwort (*Lunaria*); this was sprinkled or placed upon the head of a person for protection. Is such a tradition long dead? No, for the ill-scented rue forms the basis for a number of perfumes with which both women and men now "anoint" themselves—more to attract strangers than to repel them.

"Sacred herb" was an early name for the vervain (*Verbena officinalis*). The generic epithet *Verbena* meant "altar-plant" to the Romans of old, and this same plant was employed by the Druids of old in their lustral water. As an herb of Venus, it was also reputed to inspire love, and was often worn around the neck as a talisman of bruised leaves. St. John's wort is known to botanists as *Hypericum perforatum*, a yellow-flowered prostrate herb with delicate punctate leaves. *Hypericum* derives from the Greek word meaning "over a phantom," or "apparition," for it is said that the odor of *Hypericum* is so obnoxious to Satan and his clan that a whiff of it will cause specters to flee. Because the petals of the flower are



Ruta graveolens—"Rue,
that sour herb of grace."

A sprig of rue (*Ruta
graveolens*) will drive out
demons.





often spotted with red, it was said that this is the blood of St. John, on whose anniversary day of beheading (August 29) the herb is supposed to bloom. On St. John's birthday (June 24) the herb is to be hung in a window to keep away ghosts, necromancers, and other evildoers.

A peculiar belief on the Isle of Wight holds that a man who tramps upon the herb at night will be uplifted by an enchanted horse that will carry him to unseen realms. Gathered on a Friday in the hour of Jupiter, the herb becomes potent enough to cure melancholy.

Another cure for melancholy is the thistle (*Cnicus benedictus*), which is often called "blessed thistle" and is consecrated to the Virgin. Ancient Greeks felt that a man who ate the roots and leaves would change his blood as the seasons change (the belief then prevalent was that the blood becomes thick in the winter months and engenders melancholy). When, during one of his campaigns, Carolus Magnus (Charlemagne) prayed for aid in relieving the plague, he was instructed by God to shoot an arrow into the air, and where it landed he would find an herb to aid him. The caroline thistle, named for Charlemagne, was thus prized as a divine herb to aid those sick from plague.

Mistletoe (*Viscum album*) is a parasite frequently employed at Yuletide (a pagan holiday *Heoul* celebrating the winter solstice) to inspire passion reflected in kissing. As a charm to bring devotion to oneself, mistletoe has an ancient history. Since it grows parasitically on trees such as oak and juniper, the Druids believed it to be sacred and born of the spirit world. When it was cut with a blade of gold, it was caught in a pure white cloth. Subsequently two white bulls had to be sacrificed under the tree to atone for the cutting. Twigs bearing fruit were distributed for hanging above doors, and for use as amulets, rings, and bracelets, all to ward off evil forces. It not only protected against witchcraft, but against apoplexy, tremors, poisoning, consumption, and other afflictions as well. Norse mythology relates the death of the young hero Baldur by a spear which his opponent Hodur fashioned out of the wood of mistletoe. Freya, in her great compassion, restored Baldur to life and made herself protectress of the mistletoe. Its strength depends upon it not touching the earth;

Hypericum perforatum.

Its odor causes Satan and
other apparitions to flee.



this is why it is always found hanging. In the Christian tradition it was one of dozens of plants identified as the wood of the Cross, and monks of the medieval Church wore bits of the wood around their necks and drank decoctions of the stem in water. However, because of its diminutive form, it could not have been used to fashion a cross large enough to support a man.

Druid mythology includes the curious club moss *Lycopodium*, meaning "foot of the wolf," in reference to the creeping paw-like shoots. Lacking a flower, this plant is fairly low on an evolutionary scale, having the ferns as close allies. Druid nuns living on the Isle of Sain in the Loire River valley of France gathered these plants

Lycopodium sp., a Druid altar plant whose exposition brings good fortune.



Phoradendron flavescens (Cf. *Viscum album* [mistletoe]),
the plant sacred to
the Druids.

for their altars in a most bizarre ceremony. Before gathering expeditions were initiated, bread and wine were prepared as votive offerings and a newly woven white cloth covered the head of a virgin who personified the moon; her feet had to be washed clean. Encountering *Lycopodium* she drew a circle around it with the little finger of her right hand, and then pushing her right hand through her left sleeve, she uprooted the herb with the little finger of her right hand and covered it with the pure cloth. This altar plant became a most sacred item, and its exposition was said to bring good fortune to the Druids.

Greek mythology attributes to the physician Paeon the role of the world's first doctor; his followers were known as the *paeoni*, from whence we derive the name for the peony of our gardens (*Paeonia officinalis*). Paeon was the "giver of light," and as all men know, his power existed by reason of his being the mortal form of the god Apollo. The peony remained under his protection, and no man dared pluck it from the ground lest its guardian, the woodpecker, tear his eyes out. When the plant was finally given to the people, it was as a "medicine" to protect them from the evils of witchcraft, and the fleshy roots were cut into segments that could be worn as beadlike amulets about the neck.

Were the Greeks the first to use plants to protect them against demonic powers? Apparently not, for in the book *Devils and Evil Spirits of Babylonians*, R. C. Thompson cites a clay tablet, designated as Tablet B of the Utukke Limnute tablature, on which there is the following inscription:

Fleabane (*Inula dysenterica*) on the lintel of the door I hung,
 With *Hypericum*, caper, and wheat ears.
 With the halter of a roving ass,
 Thy body I restrain.
 O Evil Spirits get thee hence!
 Depart, O Evil Demon.

It seems apparent that man's oldest civilizations employed plants in this nonnutritive manner, and that they suffered all the fears of demonic possession that later generations were heir to. Ancient Egypt also had its sacred plants, such as the mandrake, which brought Ra's triumph over the evil power of Hathor. The lotus



Paeonia officinalis
(peony) is guarded by
woodpeckers that will tear
out the eyes of anyone
who plucks the plant.



The scent of lotus
Nelumbo nucifera will
protect those who
inhale it.

(*Nelumbo nucifera*), when inhaled, had the power to protect any who breathed the scent and venerated the flower. A curious addendum to this is a recent report that one of the water lilies (*Nymphaea coerulea*) prized by the ancient Egyptians has a narcotic flower.

Woodpeckers figure in more than one legend connected with herbs of grace, and one of the most humorous is that of “the woodpecker



and the blasting root.” Springwort, or blasting root, is a species of *Euphorbia* which has the reputation of being very elusive except on St. John’s Eve, on which night it is easily found if one “captures” it. A slow person will have trouble collecting the plant, for it darts among the ferns attempting to evade its pursuer. As the following illustrates, the oldest and simplest prescription for finding this herb has much to do with its powers.

Blasting root is said to have the force to undo locks and open hidden entrances to treasures. Pliny attributed this to an electric force that he believed generated its magical properties. Nonetheless,



Nymphaea coerulea, sacred to the Egyptians, has a narcotic flower.

by deductive reasoning the ancients formulated the notion of stopping up the passage to a woodpecker's nest so that when he returns home he will not be able to enter; the dismayed bird will immediately seek the blasting root to open the portal to his home, and when this is accomplished, will drop the herb into the hands of the gatherer. St. John must rest uneasily over such tales.

Detecting a witch requires blessed herbs, which the Evil One and his disciples cannot abide. Marjoram (*Majorana hortensis*), which usually finds repose on a spice rack, used to be presented in the form of a bouquet to a female suspected of having sold her soul to Satan. If she could not abide such a present, her guilt was ascertained and she was burnt. The disguise of witches is equally well removed by presenting a suspect with a bouquet of rue, broom (*Genista*), maidenhair fern (*Adiantum pedatum*), agrimony (*Agrimonium eupatoria*), and ground ivy (*Glechoma hederacea*). Witches cannot tolerate such nosegays, and must therefore reveal themselves.

Scarlet pimpernel (*Anagallis arvensis*), said to have appeared on the soil at Calvary when the drops of Christ's blood fell to the ground, was considered very efficacious in counteracting spells of witches, especially their nasty trick of embedding splinters in one's flesh. *Solanum dulcamara*, commonly known as bittersweet, produces coral-red berries which, when hung about the neck, ward off the evil eye. Hag's taper, or *Verbascum thapsus*, was supposed to aid witches in their filthy rites by serving as candles; however, the leaves of this same plant, if gathered when the sun is in Virgo and the moon in Aries, will protect a man against these same hags. Josephus in his *Wars of the Jews* advises carrying a bit of mandrake root in one's pocket, for witches loathe the scent of mandrake. *Vinca minor*, or the lesser periwinkle, is a great protector; it is gathered when the moon is nine nights' or eleven nights' or thirteen nights' or thirty nights' old—tradition is very accommodating. When Satan makes his appearance in the guise of a serpent, it is necessary to have calamint (*Calamintha officinalis*) about. *Kalos*, which is Greek for "excellent," had reference to its excellence in revealing the Archfiend.

Most versatile in freeing one from enchantment by witches is the English mountain ash (*Sorbus aucuparia*), which country people know as the rowan tree. It is a tradition that where this ash thrives, no witch survives. The notion of driving a stake into the heart of



Anagallis arvensis, used especially to counteract the witches' spell that embeds splinters in one's flesh.



Verbascum thapsus,
or hag's taper.

Count Dracula was an elaboration of a fairly common practice of quieting malicious spirits of people by ending their wanderings with a rowan stake through their hearts at the time of burial and the exhortation of "*Fuga daemonum!*" ("Devil, flee!"). Generally, plants bearing red berries are abhorrent to witches; thus the mountain ash was an even stronger deterrent to hags. Mugwort (*Artemisia vulgaris*), dedicated to Artemis (Diana), was a great protector against "flying vile things," the explanation being that it produced a red light visible only to the eyes of witches. Because these night rovers could not bear light, flowers of a gold color, like the marigold (*Tagetes* sp.), were excellent to aroint witches.

Artemisia vulgaris, the mugwort, protects against "flying vile things."

Opposite: *Tagetes* sp., a marigold for driving away witches.





Beyond the pickle jar, dill (*Anethum graveolens*) has its uses. Europeans have used "dill water" to quiet babies. While this tradition has a sound basis, it is also anchored in protective sorcery, for *dillan* is a Saxon word meaning "to comfort" or "to lull." Its earliest use was to protect children from malicious spirits roving the night.

Such evil spirits must still abound, for both the Catholic and Episcopal churches maintain rites of exorcism that harken back to medieval times. And censers may be related to two traditions—one of the shaman sending his soul on a journey and placating heaven with a goodly scent, and the other relating to the practice of driving out witches with smoke. Numerous oil-containing plants, such as hemlock, caper-spurge rue, juniper, and sloe, were made into bundles of sticks like the broom of a witch. This was done on Thursdays at midnight, and the bundles were kept until May Day, at which time even they were burned by those who had received absolution and were in a state of grace. Such an act is symbolic of the burning of witches, for the bunches of twigs and branches are known as "faggots"—a term still used in parts of Great Britain to denote a witchlike old crone. Over four thousand ladies suspected of witchcraft have been burned in England since the reign of James I. Records indicate that this practice extended into the second half of the nineteenth century and was rampant in New England. How much more civilized to present the witch-suspect with one of her least favorite flowers and allow her to flee.

One might well ask: Is there any substance to the notion that certain plants can drive away Satan and his disciples? In one sense this must be answered in the affirmative, for a survey of most of the plants mentioned thus far would reveal them to be possessed of strong scents. These fragrances or vile odors are largely from leaf glands or resinous materials stored within the woody plant body. Such vapors were also the province of the herbalist and apothecary who, in an independent tradition, were using many of these in their medicines. Disease has long been associated with evil, and even today we find ministers in the Western Christian tradition exhorting Satan to flee or driving demonic spirits from the body of a sick person.

Incantation and exorcism of evil often accompanied the use of herbs at an earlier date. When plagues were prevalent throughout the Old World, it was a frequent practice to attempt to reduce the casualties by spreading odoriferous herbs on streets where people

congregated for fêtes or for the entrance of a regal personage into a city. Strewing herbs, as these were called, consisted of such oil-bearing plants as rosemary, thyme, oregano, tarragon, and the like. When a physician was called to minister to a sick person, he appeared looking like a gigantic bird, his face masked in a pointed beak filled with fragrant herbs. Since all this predated the knowledge of bacteria and viruses, the purpose of the herb-filled beak was not only to perfume the attendant physician's nostrils against the repugnant stench of death and decay, but to protect him from illness by keeping the evil which infected the plague victims from entering his body.

It was a common belief that body orifices served as ports of entry for demons who would then produce ill effects on their victims. Hence the earliest medicines were used rectally, orally, in the ears, in the nostrils, and in every other orifice. There is a direct relationship between the inception of medicine and "white magic" and the use of herbs of grace to protect a man and to drive away demonic spirits. It is likewise true that there was some soundness to these practices, for laboratory experiments have shown that the majority of oil-producing plants which have been discussed herein have bacteriostatic properties. These curious and precious herbs of grace are in themselves a branch of protective witchcraft, and beyond that are a part of the foundation of modern medical practices.

In 1622 the poet Michael Drayton enumerated in his poem "Polyolbion," both evil and beneficial plants that were in use in his day. In this eloquent summation of herb lore and superstition, we find that almost seventy-five percent of the herbs mentioned are to be found in pharmacopeias extending well into the twentieth century. The roots of modern medicine are well grounded in both faces of witchcraft—Satan's simples and herbs of grace.

A Select Bibliography

Due to the inaccessibility of books from which the author has derived much of the information contained in this volume, they are not listed in this bibliography; rather, it was deemed appropriate to list only those volumes to which the reader might have access.

I am indebted to the Huntington Library of San Marino, California, for those rare volumes which they so generously made available to me.

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Mugwort Lore

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MUGWORT LORE

BY EDWARD A. ARMSTRONG

THE plant called mugwort (*Artemisia vulgaris* L.) which grows on waste land and hedge banks in Great Britain is nothing regarded nowadays but was once able to arouse a host of strange ideas, magical conceptions and sacred associations amongst our forefathers. It is not pretty, nor even conspicuous, and it is remarkable that it should ever have attained to fame and sanctity. The stems are about three feet high and it produces purplish flowers in August. Probably its slightly aromatic scent was the characteristic which first aroused man's attention and initiated the process of building up an ideology of considerable magnitude in connexion with this weed.

Mugwort is usually regarded as a native plant but there are so many parts of the British Isles where it is met with under suspicious conditions that doubts arise as to whether it is really indigenous. The writers of a considerable number of county floras consider that it may have been introduced in times long past. It is quite often found near houses in circumstances which suggest that at one time it was cultivated. As it had, as we shall see, a high medicinal reputation, it is not surprising that this was the case. Taking all the evidence into consideration I think it very probable that artemisia was one of the first herbs cultivated by man and that he took roots of it with him on his travels. I consider that anthropological evidence is against, rather than in favour of, the plant being indigenous in Britain.

In the Isle of Man, where mugwort was called *Bollan feaill-Eoin* "John's feast-wort," it was gathered on Midsummer Eve "as a preventive against the influence of witchcraft" and placed in chaplets on the heads of man and beast to ward off evil influences.¹ In France, where it is also called after the Midsummer Day Saint, it is worn to prevent aches and pains.² In Germany the people had like customs and eventually threw the girdles and crowns of mugwort into the Midsummer fire. In East Prussia it was used for divination.³ At Midsummer *Artemisia alba* is used as a fumigant in Morocco.⁴

These beliefs and practices are of very ancient origin. The mugwort lore in the herbalists Gerarde, Parkinson and Culpeper was derived from Dioscorides, Apuleius and Pliny, but the plant was a herb to conjure with long before any of these writers lived. Probably Stone Age magicians used it in their rites.

What is the likelihood that a dingy weed should be chosen for special

¹ J. Train, *Historical and Statistical Account of the Isle of Man*, II, 240. It has several Welsh names including *Bydiog lwyd* "the grey herb giving life" and *Llysiau Ifan* "John's herb." I owe this information and notes of the plant's distribution to Mr. A. A. Dallman.

² A. de Gubernatis, *Mythologie des Plantes*, I, 189.

³ J. Grimm, *Deutsche Mythologie*, III, 356 f.

⁴ E. Westermarck, *Ritual and Belief in Morocco*, II, 185.

honour independently in various places throughout the world? The chances that men in widely separated places should select mugwort independently as a magical herb are remote; the possibility that in more than one locality they should not only choose it from amongst all other plants but also attach to it the same magical qualities is completely out of the question. We may confidently believe, therefore, that mugwort was selected as having magical properties thousands of years ago and that the lore connected with it was passed on from community to community round the world. This humble hedgerow plant testifies to the un-inventiveness of early man's mind and adds a substantial weight of evidence to the view that culture spread much more through the diffusion of ideas than by means of independent discovery in more than one place. Mythologies enshrine an important historical fact when they attribute beneficial inventions to one man such as Osiris in Egypt or Triptolemos in Greece.

Let us compare Chinese beliefs about mugwort with European ideas. Amongst the inhabitants of the Middle Kingdom the herb was considered to have magical potency from the earliest times of which we have record. There is a reference to it as one of the weeds which had to be destroyed before people could settle in China.⁵ The Odes are undoubtedly very early and contain veiled reminiscences of quite primitive practices. In one of them, an invitation to transcendent beings "in the respectful hope of a meeting," there are the words "we burn some fat mixed with mugwort," indicating that the herb was used in worship and probably was believed to have some efficacy in conjuring up the appearance of divinities.⁶ It is also recorded in the Odes that:

The reverent ladies of the palace go out to gather the *artemisia* and duckweed which grow by the ponds and shallow pools. They bring the weeds home in their baskets, and in their tripods they boil them and make them into dishes for the sacrifice in the ancestral temple.⁷

An old Chinese calendar notes:

On the Fifth day of the Fifth month the four classes of the people gambol in the herbage and have competitive games with plants of all kinds. They pluck mugwort and make dolls of it, which they suspend over their gates and doors in order to expel poisonous airs or influences.⁸

Herbs picked on the "Double Fifth"—that is, the summer solstice—are believed to be particularly potent. Medicinal remedies should be compounded on that day.⁹

⁵ *Tso chuan*. Tr. Couvreur, III, 267.

⁶ *Odes: Hsin-nan-shan*; J. Ross, *Original Religion of China*, p. 202; L. Wiegner, *A History of the Religious Beliefs and Philosophical Opinions in China from the beginning to the present time* (Hsien-hsien, 1927) Tr. E. C. Werner, pp. 54, 287.

⁷ J. Ross, *loc. cit.*

⁸ J. J. M. de Groot, *The Religious System of China* (Leyden, 1910) VI, 947, 1079.

⁹ L. Hodous, *Folkways of China* (London, 1929) pp. 126-7, 130 f. In the Gobi desert a bunch of *Artemisia annua* is nailed on the doors on the Double Fifth. Cf. M. Cable and F. French, *The Gobi Desert* (1943) p. 103.

It is still a common custom on the Double Fifth for the Chinese householder to fasten on each side of the main door of his house a small bunch of mugwort and sweet flag tied with a red paper band. These herbs should be picked before dawn and their purpose is to ward off disease and evil spirits which proceed from the female principle Yin. Their strong odour represents the Yang, or male principle. On the lintel are affixed effigies of the so-called Taoist Pope, Celestial Sage or Thunder God, Chang T'ien Shih, with his thunder weapon, or a representation of a monk holding a mosquito brush with which he is able to waft away noxious vapours and evil influences. A common proverb says: "On the Fifth day of the Fifth month at noon the Celestial Sage rides on the mugwort tiger."¹⁰ There is a belief that at this season when the Yang attains its culmination the five spirits of poison appear. The Chinese regard poison as excess of Yang. Harmony is attainable by means of a balanced relationship between Yin and Yang, and Chinese Magic, like Confucian philosophy, is dominated by the conviction of the undesirability of extremes. When the Dragon Boat Festival is held at the Double Fifth sprigs of mugwort are hung from the eaves of the houses. According to the records this Festival dates at least as far back as Chou times¹¹ but there can be little doubt that it is an extremely ancient solstitial ceremony, designed, like so many sports and competitions the world over, to propitiate or augment the powers of the sun.¹²

Whatever inherent efficacy might be attributed to mugwort it was essential to pluck it at Midsummer when light and fire are at their zenith.¹³ In Chinese surgery the plant was used for cauterization¹⁴ and it is also employed medicinally to cure gout.¹⁵ During the ordination ceremony of Buddhist monks small balls of dried and greased artemisia are placed on the heads of the aspirants and burned so that permanent scars are left on the scalp.¹⁶

Not only in China but all over Asia mugwort was, and still is, a herb of magical potency. The Ainu of Japan make mugwort images which they thrust upside down into holes in order to bring misfortune upon their enemies.¹⁷ In ancient China mugwort images were also made on the Double Fifth. Infusions of the herb were taken as a beverage in China.¹⁸ and it is much eaten in spring by the Ainu.¹⁹ Mugwort was eaten in

¹⁰ A. Grainger, *Studies in Chinese Life* (Chengtu, 1921) p. 52.

¹¹ E. C. Werner, *Descriptive Sociology of the Chinese*, p. 179.

¹² Sir J. Frazer, G.B.³, X, 160 ff.; XI, 290 ff.

¹³ J. J. M. de Groot, *op. cit.*, VI, 947.

¹⁴ *Ibid.*, p. 946; J. F. Davis, *The Chinese* (London, 1844) III, 51.

¹⁵ H. A. Giles, *cit.* in R. Harris, *The Ascent of Olympus* (Manchester, 1917) p. 86; J. F. Davis, *loc. cit.*

¹⁶ J. Doolittle, *Social Life of the Chinese* (London, 1866) II, 54. L. Reichelt, *Truth and Tradition in Chinese Buddhism* (Shanghai, 1927), p. 246.

¹⁷ J. Batchelor, *The Ainu and their Folklore* (London, 1901), pp. 329 f.

¹⁸ M. Granet, *Danses et Légendes de la Chine Ancienne* (Paris, 1926) II, 532.

¹⁹ J. Batchelor, *op. cit.*, p. 199.

Scotland comparatively recently and was considered to be a cure for consumption. There was a rhyme, attributed to a mermaid :

If they wad drink nettles in March
And eat muggons in May,
Sae mony braw maidens
Wad na gang to clay.²⁰

In Annam bunches of mugwort are hung up in houses at the New Year ²¹ and in Ceylon it is an important item in the native pharmacopoeia. Its use in India is undoubtedly very ancient.²² Gmelin recorded that a species of mugwort was employed to propitiate evil spirits by the Tartars ²³ and Georgi stated :

The pine tree, a kind of mugwort and the ivy of Kamschatka are the plants consecrated to the gods and their scent is agreeable to them ; that is why they decorate their idols and their victims with these plants.²⁴

The special interest of this mugwort lore is that not only is the herb regarded as having a magic potency throughout Europe and Asia but there is a point for point identity of ideas in regard to it in East and West. Moreover these conceptions can be traced so far back in time that there is no possibility that they are due to recent facilities of travel and communication.

We have seen that it is at the Summer Solstice that mugwort is gathered and used in China. In Europe belief and practice in this matter are identical. The Chinese say it deters devils. Cockayne's *Anglo-Saxon Leechdoms* comments, "It puts to flight devil-sickness" (Demoniac possession). The same work, quoting from Apuleius, says that it should be hung over the door of the house—exactly as is done to this day in China and Annam. In Baden a bride puts artemisia in her shoe and a blossom of the plant on the wedding table ²⁵ and in China artemisia, peony and pomegranate are among the flowers given to a bride.²⁶ The Chinese put artemisia in the water of the baby's first bath ²⁷ while in the *Hortus Sanitatis*, published in Mainz in 1491, we read :

Ut infantem hilarem facias incende et suffumigabis et omnes malorum averte . et hilariorum faciet infantem . nervorum dolorem et tumorem trita cum oleo bene subacta mirifice sanat.

Sosibius, quoted by Clement of Alexandria, mentions an Artemis Podagra which cures gout. We have already noticed that artemisia is prescribed

²⁰ R. Chambers, *Popular Rhymes* (London and Edinburgh, n.d.) p. 331.

²¹ P. Giran, *Magie et Religion Annamites* (Paris, 1912) pp. 118, 185, 256.

²² J. Attygalle, *Sinhalese Materia Medica* (Colombo, 1917), p. 102.

²³ J. G. Gmelin, *Flora Sibirica*, II, 24.

²⁴ J. G. Georgi, *Beschreibung aller Nationen des russischen Reichs* (S. Petersburg, 1776).

²⁵ A. Wuttke, *Der Deutsche Aberglaube* (2nd edn. Berlin, 1869), p. 133.

²⁶ G. Doré, *Researches into Chinese Superstitions*, V, 302, 646, 732.

²⁷ N. Waln, *The House of Exile* (London, n. d.), p. 99.

for gout in China. Pliny mentions it as a prophylactic against traveller's fatigue.²⁸ Mugwort we have seen to be associated with the thunder god in China; according to A. de Nore wreaths of mugwort are believed to furnish protection against thunder and thieves in France.²⁹

There are goddesses associated with mugwort in Europe, the Far East and in Mexico. The goddess Ho Hsien Ku in China, who is called Kosinko in Japan, is depicted as a young woman clothed in mugwort, holding a lotus stem and flower, and talking to a Fêng Huang, the so-called Chinese phoenix.³⁰ The Mexican god Tlaloc, who was a thunder god, and his consort Chalchihuitlicue were both associated with artemisia. The district of Tlalocan where he was believed to hold sway was called "Place of the Mugwort"³¹ while the goddess dwelt on a mountain called Yauhqueme, meaning "Covered with Mugwort."³² Here a child was sacrificed to her.³³ It will be remembered that Artemis dwelt on Mount Taygetus where artemisia grew. In Morocco *Artemisia alba* is hung inside doorways to keep snakes away³⁴ while at one of Tlaloc's festivals live water snakes were swallowed. Chalchihuitlicue was sometimes represented as a frog; jadeite was associated with her and the pearl with her husband. In China jade is sacred and the pearl is closely connected with the dragon. The pattern of ideas associated with mugwort in America is so similar to that in Eurasia that the onus of proof lies upon those who would maintain that it does not provide evidence of culture borrowing.

Artemis was apparently a northern goddess but her cult was more widely spread than that of any other Hellenic goddess.³⁵ It bore traces of being early and primitive for amongst its practices were holocausts of living birds and beasts.³⁶ She was associated with maternity and child-birth, and according to Euripides would not speak to childless women.³⁷ Moreover, she had a good deal to do with witchcraft.³⁸ Dr. Rendel Harris has maintained that Artemis and her brother Apollo are both witch doctors and that they evolved from the mugwort and the apple respectively. The magical medicine used by the priest, priestess or shaman confers strange powers upon him or her. The plant is projected into a deity and eventually personified.³⁹

²⁸ H. N., XXVI, 89.

²⁹ A. de Nore, *Coutumes, Mythes et Traditions des Provinces de France* (Paris and Lyons, 1846), p. 262.

³⁰ H. L. Joly, *Legend in Japanese Art* (1908) p. 165.

³¹ L. Spence, *The Gods of Mexico* (1937) p. 256.

³² D. A. Mackenzie, *Myths of Pre-Columbian America* (1924) pp. 201, 111.

³³ L. Spence, *op. cit.*, p. 261.

³⁴ E. Westermarck, *Ritual and Belief in Morocco* (1926) II, p. 349.

³⁵ J. Harrison, *Myths of Greece and Rome*, p. 37.

³⁶ Lucian, *De Syr. dea*, 49; Pausanias, VII, 18 12.

³⁷ L. Farnell, *Cults of the Greek States*, II, 444 ff.

³⁸ *Loc. cit.*, II, 505.

³⁹ R. Harris, *The Ascent of Olympus*, pp. 65, 80.

If this theory be sound we have an indication of the extremely ancient lineage of the mugwort cult for it would seem to have spread through Europe and Asia and to Mexico in the comparatively developed form in which a mugwort goddess is represented. Its association with thunder brings it into connexion with one of the very earliest of magical fertility conceptions, for thunder and rain-magic go together. This weed furnishes evidence supporting the view that primitive men were able to pass on ideas to one another around a great segment of the globe.



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The Ethnobotany of Sweet Flag, *Acorus calamus* (Araceae)

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THE ETHNOBOTANY OF SWEET FLAG, *ACORUS CALAMUS* (ARACEAE)¹

TIMOTHY J. MOTLEY

Motley, Timothy J. (University of Hawaii at Manoa, Department of Botany, 3190 Maile Way, Honolulu, HI 96822-2279). THE ETHNOBOTANY OF SWEET FLAG, *ACORUS CALAMUS* L. (ARACEAE). *Economic Botany* 48(4):397–412. 1994. Sweet flag, *Acorus calamus*, one of the few extratropical members of the Araceae, is a semi-aquatic component of aquatic habitats throughout the temperate to sub-temperate regions of Eurasia and the Americas. The plant has a rich ethnobotanical history dating back possibly to the time of Moses in the Old Testament of the Bible and in early Greek and Roman medicine. Sweet flag, thought to be indigenous to India and spread along trade routes, has been valued for its rhizome and fragrant oils which have been used medicinally, in alcoholic beverages, as a fragrant essence in perfumes and oils, and for insecticidal properties. Current research investigates sweet flag's value as an insecticidal, antibacterial and antifungal agent. This paper is a comprehensive survey of the past, present and future uses of sweet flag.

Calamus, Acorus calamus, ethnobotanique. Calamus, Acorus calamus, l'une des rares espèces non tropicales de la famille des Araceae, est une semi-aquatique composante des milieux aquatiques des régions tempérées et sub-tempérées d'Euraore et des Amériques. Cette plante bénéficie d'une riche histoire ethnobotanique datant de l'époque de Moïse de l'ancien testament de la Bible et des medecines Romaine et Grecque. Calamus est probablement originaire de la péninsule Indienne et fut distribuée par les commercants pour qui le rhizome riche en huiles aromatiques, sont utilisés en pharmacopée, dans les boissons alcoolisées, la parfumerie et pour ses propriétés insecticides. Actuellement, des recherches sont entreprises pour évaluer les propriétés insecticides, bactéricide et fongicide de cette espèce. La présente étude fait une synthese des usages et des potentialités de cette espèce (calamus).

Key Words: *Acorus calamus*; sweet flag, calamus; ethnobotany; alkaloids; essential oils.

Sweet flag, *Acorus calamus* L., is an uncommon but widespread, semi-aquatic plant of aquatic habitats in temperate to subtemperate regions. A herbaceous perennial (Fig. 1), sweet flag has long, erect, narrow, aromatic leaves ascending from a branched, underground rhizome (Fig. 2). The seemingly numerous plants seen above ground in a population probably arise from a single plant connected by an extensive underground rhizome. Internally the rhizome (Fig. 3) is whitish pink in color and pleasantly aromatic, smelling of citrus, although it has a bitter taste. The inflorescence consists of a leaf-like spathe and a spike-like spadix, produced from the middle of the spathe, that is densely covered with yellow and green flowers (Fig. 4).

Sweet flag has traditionally been placed in the Araceae, the arum family, based on morpholog-

ical similarities between it and other members within the family. However, recent taxonomic studies based upon morphological, anatomical, developmental, and molecular data suggest that *Acorus* be placed in its own monotypic family (Bogner and Nicolson 1991; Duvall et al. 1992; Grayum 1987).

The species has been redefined primarily on the basis of genome differences. *Acorus calamus* var. *americanus* (Raf.) Wulff comprises diploid members that range in distribution from North America to Siberia. The sterile triploid *A. calamus* var. *calamus* (= *vulgaris* L.), is distributed throughout Europe, temperate India, and the Himalayan region, and the tetraploid variety, *A. calamus* var. *angustatus* Bess., is found in eastern and tropical southern Asia including Japan and Taiwan (Bown 1988; Röst 1979).

Sweet flag was included in many early herbals and has a rich history dating back to early Greek and Roman medicine. In addition to its medic-

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Fig. 1. Sweet flag in a semi-aquatic habitat, a river floodplain near Penfield, Illinois.

inal uses, sweet flag was the subject of superstition and poetry, and the fragrant leaves, smelling of tangerine or citrus, were used on the floors of homes and churches to remove disagreeable odors and deter pests. Candied, the rhizome was a European and early American confection.

The plant was initially distributed from its native range through trade and commerce. The rhizome was subsequently cultivated and the plant

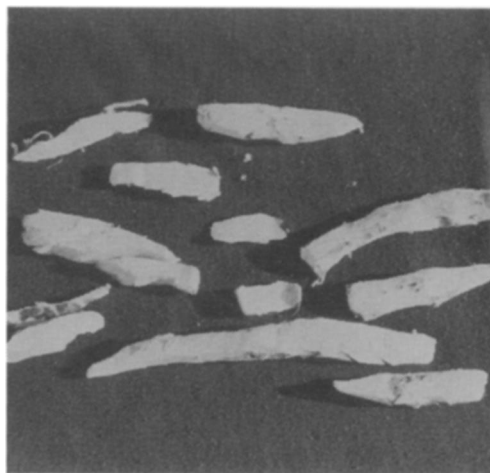


Fig. 3. The peeled, white, internal portion of the sweet flag rhizome prepared for consumption or medicinal use.

spread by vegetative means (Grieve 1971). The rhizomes were utilized extensively by the Chinese, Indians, and American Indians, as well as by other cultures, and many of these uses continue to this day.

Presently, the fragrant oils obtained from the rhizome are used medicinally, as flavoring in alcoholic beverages, as fragrant essences in perfumes and sacred oils, and for insecticidal properties. Research has been initiated on the chemical compounds in the rhizome to determine their

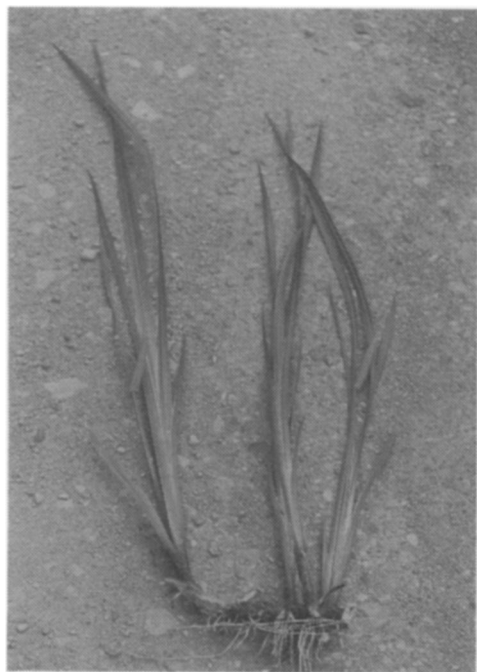


Fig. 2. A sweet flag specimen showing foliage, inflorescence, rhizome and roots.

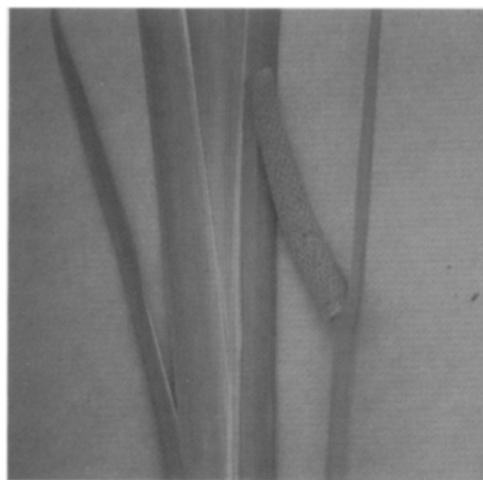


Fig. 4. The spathe and spadix of a sweet flag inflorescence.

usefulness as medicinal, insecticidal, antibacterial, and antifungal agents.

CHEMICAL COMPOSITION

The major chemical constituents of the essential oils of sweet flag are phenylpropanes, monoterpenes, and thermolabile sesquiterpenoids (Röst and Bos 1979). Studies of the volatile constituents of sweet flag using gas chromatography and mass spectrometry detected 184 compounds in the oil of the triploid European *A. calamus* var. *calamus* and 93 compounds in the oil of the tetraploid Indian *A. calamus* var. *angustatus*, with β -asarone as the major constituent. These chemical constituents consisted of 67 hydrocarbons, 35 carbonyl compounds, 56 alcohols, eight phenols, two furans and four oxido compounds (Mazza 1985a). Mazza (1985b) also detected, in an alcohol extract of *A. calamus* var. *calamus*, 243 volatile components, 45 of which were new records from sweet flag.

Methyleugenol, cis-methylisoeugenol, β -asarone, geranylacetate, β -farnesene, shyobunone, epishyobunone, isoshyobunone, and an unknown constituent are the most abundant chemical compounds constituting about 20% of the essential oil (Röst and Bos 1979). The other chemical components include α and γ -asarone, calamenene, asaronaldehyde, acorenone, calamenone, n-heptanic acid, calanendiol, numerous sesquiterpenes, and other compounds in trace amounts (Mazza 1985a; Perry and Metzger 1980).

The proportion of each chemical compound in the essential oil varies among the varieties of *A. calamus*, corresponding to the ploidy level of the taxon (Mazza 1985a; Röst and Bos 1979). β -asarone concentrations vary markedly among the oils from the three varieties. The tetraploid plant oil is high in β -asarone (90–96%) and also contains α -asarone. The triploid plants contain a small portion of β -asarone (5%) in their oil and the diploid plants lack β -asarone, but contain high amounts of geranylacetate. Individual plants also show variation in the percentage of chemical components depending on the part of the plant from which the oil was extracted (Röst and Bos 1979).

Chemical isolation studies have led to the discovery that the two stereoisomers, α and β -asarone, have psychoactive effects (Ott 1975). According to Schultes and Hofmann (1980) “the root induces an experience similar to LSD in

sophisticated subjects.” Native Americans who consumed the root reported that it relieved fatigue and compared the experience to “walking a foot off the ground” (Schultes and Hofmann 1980). In chemical structure α -asarone is similar to mescaline, the alkaloid in the hallucinogenic peyote cactus [*Lophophora williamsii* (Salm-Dyck) J. Coulter] (Lewis and Elvin-Lewis 1977) or amphetamines (Elliott 1976), and β -asarone is chemically like myristicin and kava (*Piper methysticum* G. Forster) alkaloids (Lewis and Elvin-Lewis 1977). The pale yellow to pale brown volatile calamus oil has an odor described as “woody-spicy with increasingly sweet afternotes and great tenacity” that resembles “dried milk or sweet leather, slightly creamy-nutty,” and has been compared to the fragrance of a milk-truck or shoe-repair shop (Arctander 1960). This characteristic aroma is derived from the chemical compound (Z,Z)-4, 7-decadial which is present in the oil at about 100 000 times its odor threshold value (van Lier, van der Linde, and van der Weerd 1986). This oil and asarone have a relaxing effect on smooth muscle tissue, similar to the effects of papaverine found in the opium poppy (*Papaver somniferum* L.). Tannins, starches, mucin (Thomson 1978), soft gums, and resins are also found in sweet flag (Grieve 1971).

TOXICOLOGY

Sweet flag is poisonous under certain conditions, causing disturbed digestion, gastroenteritis, persistent constipation, followed by diarrhea and passage of blood into the feces (Pammel 1911). In 1968 the U.S. Food and Drug Administration reported that the use of sweet flag was unsafe, based upon cancerous tumors found in laboratory animals treated with the plant (Dobelis 1986; Furia and Bellanca 1971). Though the use of sweet flag is prohibited in the United States and Canada, sweet flag is still used traditionally in many European countries to flavor spirits with the recommended limit of 0.1 mg/kg in food and beverages and 1 mg/kg in spirits and spices. Since the European triploid variety contains far less β -asarone than the tetraploid Indian variety, Lander and Schreier (1990) determined that by screening products containing calamus oil for the acorenone and γ -asarone it is possible to determine the variety of the plant from which the oil originated. The carcinogenic agent, β -asarone, seems only to be present in the

triploid and tetraploid varieties of sweet flag. The diploid varieties lack β -asarone and other toxic phenylpropane derivatives (Duke and Ayensu 1985; Lander and Schreier 1990; Mazza 1985a; Röst and Bos 1979) which may present a possible solution to this problem. The volatile oil, when in contact with the skin, has been known to cause dermatitis in some cases (Mitchell and Rook 1979).

ETYMOLOGY

A variety of names has been associated with sweet flag. The large number of names attributed to this plant attests to its rich history and use by many cultures in the past. Some of the English folk names include calamus, sweet rush, sweet root, sweet cane, gladdon, sweet myrtle, myrtle grass, myrtle sedge, cinnamon sedge (Grieve 1971), flagroot, myrtle flag, sweet cinnamon (Angier 1974), beewort, pine root, drug sweet flag (Elliott 1976), sweet segg (Harding 1966), sweet grass (Lucas 1966), reed acorus, sweet flagroot (Krochmal and Krochmal 1975), water flag, yellow flag (Simmonite and Culpeper 1957), rat root, and sweet calomel (Schultes and Hofmann 1980).

Many of the common names were derived from the appearance of the plant's long, sword-like foliage. The term "flag" refers to the drooping, prostrate, iris-like leaves. Yellow flag (*Iris pseudoacorus* L.) and blue flag (*I. versicolor* L.), two species of the Iridaceae, are often mistaken for sweet flag in the vegetative state. Sweet flag has also been called a rush, grass, reed, cane, sedge, and myrtle, due to the similarity of sweet flag foliage to that of representatives from other families.

The term "sweet" refers to the pleasantly aromatic odor of the plant. The economic utilization of the rhizome led to the application of the common names sweet root, rat root, pine root, and flag root, which incorrectly refer to the underground rhizome as a root.

HISTORY AND FOLKLORE

One of the earliest records of sweet flag is the calamus of the Bible. It was first mentioned when God told Moses to make a holy oil to anoint the tabernacle, the ark of testimony, and other ritual paraphernalia (Moerman 1981). In the wilderness Moses received instructions to use myrrh, frankincense, cinnamon, calamus, cassia, gal-

banum, and sweet spices in the making of the holy oil (Exodus 30:23, 24, 34). Calamus was also one of the plants said to grow in the gardens of Solomon (Solomon 4:14). It was later mentioned (Ezekiel 27:19) as one of the market plants of Tyre. There are some differences of opinion as to whether the calamus mentioned is *Acorus calamus*. Some scholars believe that the calamus of the Bible actually refers to beardgrass (*Andropogon aromaticus* L.) (King 1941) or to lemon grass (*Cymbopogon* sp.) (Wheelwright 1974).

The remains of sweet flag were one of many plants found in the tomb of King Tutankhamen (Bown 1988). Sweet flag was also used by the early Greeks and Romans. Hippocrates (460–377 B.C.) used the plant medicinally (Mabberley 1990), and in early herbals of the first century Dioscorides and Pliny referred to a plant called *acoron*, which appears to be sweet flag (Grieve 1971). Theophrastus (371–287 B.C.) mentioned calamus in his works, and Celsus reported its presence in Indian markets nearly two thousand years ago (Lloyd 1929). In India sweet flag was such an important medicinal aid for children's stomach complaints and colic that the *Materia Medica of Hindoostan* of 1813 mentioned a penalty imposed on any druggist who refused to open the door of his business in the middle of the night to a parent in need (Barton and Castle 1877).

Aphrodisiac properties were attributed to the rhizome by the Roman and Arabic cultures for centuries (Connell 1965). Its reputed ability to arouse sexual desire resulted in sweet flag being tagged with the name "Venus plant" (Wedeck 1960). Sweet flag was one of many ingredients used in a love potion in medieval times, prescribed by the physician Zacutus the Portuguese (Connell 1965).

In the eleventh century sweet flag, a native of China and India, was transported into Russia and Poland by the Tatars during their conquests. The Tatars believed that sweet flag purified drinking water, and for this reason they carried and planted sweet flag in their new settlements. Sweet flag soon became a symbol of Mongol (Tatar) invasion and was referred to as "Tatar" or "Mongolian Poison" by the natives of the conquered territories (Elliott 1976). The first record of sweet flag cultivation was in 1574 by the Austrian botanist Clusius, who obtained a rhizome from Asia Minor and propagated it in Vienna (Grieve 1971). The plant was soon reported in many other European countries. In 1588 it was

first recorded in Germany (Elliott 1976), was cultivated by Gerard in England in 1596, and was then introduced into France, Belgium (Grieve 1971), and other countries by way of exchanges between botanists, botanical societies, and botanical gardens.

Sweet flag was soon recognized as being useful and quickly gained a place in European history and superstition. It was thought to be one of the ingredients in the hallucinogenic "flying ointments" used by European witches (Ott 1975). The fragrant leaves of sweet flag were used in medieval times on the floors of castles, churches and cottages to help cover odors and repel insects resulting from poor sanitation (Dobelis 1986). Many churches used the leaves during holidays and festivals and the churches in Norfolk, England were thatched with the foliage (Grieve 1971). During the reign of Henry VIII in England, Cardinal Wolsey was brought up on the charges of extravagance, not due to his extensive land ownings but to his habit of importing, at great expense, sweet flag reeds from the faraway counties of Norfolk and Suffolk for his church in London. He was found guilty and beheaded (Elliott 1976).

During the time of the plague in Europe, when people avoided the sick and dead in order to avoid contracting the disease, a band of thieves was robbing the homes of infected people without being stricken by the disease. When the thieves were finally caught and brought to trial they were offered an acquittal if they would reveal the secret of their immunity. The mixture they drank and doused themselves with before their crimes came to be known as the "Vinegar of the Four Thieves." The potion contained beach and roman wormwood, rosemary, sage, mint, rue, lavender flowers, calamus powder, cinnamon, cloves, nutmeg, and garlic. The ingredients were then placed in a crock and red wine vinegar poured over it, then left in the sun for several weeks and distilled off, followed by the addition of camphor (Clarkson 1939).

Many North American Indian tribes used sweet flag either drunk as a decoction, or chewed raw or smoked to fight fatigue and hunger, much in the same way that South American Indians have used coca (*Erythroxylum coca* Lam.) (Ott 1975). Medicinally some tribes chewed the rhizome daily as a panacea (Moerman 1981).

Early American settlers found many uses for the plant. Pieces of the rhizome were carried in

a pocket to protect the possessor from being struck by lightning. An amulet formed from the rhizome was thought to protect the wearer from infectious diseases (Ruegg 1936). Grieve (1971) recounts that *Salmon's Herbal* of 1710 stated that there were sixteen ways in which the rhizome could be prepared medicinally: "as a liquid juice, an essence, an infusion of wine, a decoction of wine, a powder, a cataplasm, a spirituous tincture, an acid tincture, an oily tincture, a spirit, a chemical oil, potestates or powders, an elixir, a collegium, a preserve and a syrup." The Shakers and other New Englanders sold the candied "root" as a confection, which was still to be found in specialty shops by Fernald and Kinsey (1943). In astrological classification sweet flag was placed under the moon sign because of the half-moon shape and yellow color of the inflorescence and the plant's aquatic habit (Lust 1974). The distinctive shape of the flowers and rhizomes of sweet flag probably inspired the "calamus cluster" of thirty-nine poems written by Walt Whitman in the *Leaves of Grass* (Whitman 1965). This group of poems is thought to be about what Whitman called "adhesiveness . . . a personal attachment between men that is stronger than ordinary friendship" (Moerman 1981).

ETHNOBOTANY

Since sweet flag was, and continues to be, used by many different cultures and in many different countries, the ethnobotanical uses are listed by country, ethnic group, or region.

Arabic Cultures. The rhizome has been regarded as an emmenagogue, an excitant, a stomachic, a diaphoretic, a diuretic, an incisive, and an aid for flatulence, vertigo, and headaches arising from dyspepsia (Barton and Castle 1877). Sweet flag, or in Arabic, *vash* or *vaj* (Caius 1986), was an ancient remedy for "burning water" rising from the stomach to the throat. Ancient Egyptians used sweet flag to treat scrofula (Clymer 1963).

Argentina. The Spanish names for the plant are *acoro* and *acoro verdadero* (Caius 1986) and women are given the rhizome for painful menstruation (Manfred 1947).

Brazil. Medicinally sweet flag has been used as an anthelmintic (Watt and Breyer-Brandwijk 1962). The Portuguese names for sweet flag are *calamo aromatico* and *canna cheirosa* (Caius 1986).

China. The plant is called *ch'ang*, *ch'ang-p'u*, *shui-ch'ang-p'u*, *ch'ang-jung*, and *pai-ch'ang*, depending on the variety (Shih-Chen 1973), and the rhizome is recommended for inflammation of the gastric membrane, colic, and as an appetite stimulant (Wallnofer and Rot-

tauscher 1965). It is known for its attributed qualities as a smooth muscle relaxant, central nervous system depressant, hypotensive, anticonvulsant, hypothermic, analgesic, sedative, contraceptive, antipyretic, anti-diarrheal, anthelmintic, antirheumatic, antiemetic (Anonymous 1975), diuretic, carminative, laxative, emetic (Agarwal et al. 1956), and as a lotion for leprosy or pustular sores (Duke and Ayensu 1985). Sweet flag is listed as an insecticide, an antifungal agent, an antibacterial agent, and a fish toxin (Anonymous 1975). The rhizome was also prized for use in cases of bronchitis, coughs, colds, arthritis, dyspepsia, epilepsy, nausea, stroke, antiarrhythmia, and as an antiveratric (Duke and Ayensu 1985).

Powdered, the rhizome is used to treat buboes, carbuncles, deaf ears, sore eyes, anorexia, and abdominal and chest congestion. The powdered rhizome is said to act as a diaphoretic, an expectorant, and, due to the presence of coumarins, as a cure for tuberculosis (Duke and Ayensu 1985) as well as lung and heart cancer (Kirtikar, Basu, and I. C. S. 1975).

The rhizome is said to act as a desiccant for treating neurological symptoms of the brain (Perry and Metzger 1980) and inhalations are used to treat headaches (Boissya and Majumder 1980). A water mixture of the rhizome with the crushed stems of *Coccinia cordifolia* Cogn. is used for high fever and vertigo. When combined with *Alpinia galanga* (L.) Willd., *Zingiber purpureum* Rosc., and vinegar, the rhizome has been used as a depurative for women. Herbal baths of sweet flag have been said to stimulate the circulation as well as giving relief to patients with rheumatism and lumbago (Perry and Metzger 1980). Boissya and Majumber (1980) mention application of a paste made out of the rhizome to stop the bleeding of external injuries.

In China aphrodisiac properties have been attributed to the plant (Dragendorff 1898) and it was also used in a potion in order to hallucinate or "see spirits." The latter was accomplished by mixing the rhizome with the achenes of *Cannabis sativa* L. and with *Podophyllum pleianthum* Hance (Li 1977). The leaves of sweet flag and *Artemisia vulgaris* L. are used as a charm during the dragonboat festival. On the fifth day of the fifth moon the leaves are hung on the doors of homes to ward off evil spirits (Shih-Chen 1973).

England. Sweet flag has been utilized as an aromatic, a carminative, a stomachic (Wren 1956), an appetite stimulant, and an antibacterial agent (Grieve 1971); also to relieve flatulence, colic, dyspepsia (Wren 1956), ague (Wheelwright 1974), and high fever (Grieve 1971). Colic has been treated by combining the rhizome with magnesia and chalk (Wren 1956). Inhaled, the oil treats low fever and dyspepsia and clears the voice. In Norfolk, sweet flag was used as a cure for a fever prevalent in the fens and as a stimulant in typhoid cases. A tonic called stockton bitters, made of sweet flag and *Gentiana campestris* L., is used for nervous complaints, vertigo, headaches, dysentery, and catarrh (Grieve 1971).

Europe. Sweet flag has been used to prevent obesity, enhance digestion, aid colds (Moerman 1981), induce menses (Jochle 1974), and as a carminative (Watt and Breyer-Brandwijk 1962). The rhizome was chewed as a masticatory to clear the voice (Barton and Castle 1877) and powdered to flavor beef and snuffs (Barton and Castle 1877). It has been added to toothpaste (Lewis and Elvin-Lewis 1977), perfumes, toilet powders, and sachets (Hill 1952).

France. Sweet flag (*acore*, *acore aromatique*, *acore odorant*, *acore vrai*, *acori*, *acrois*, *galanga des marais*, *roseau aromatique*, *roseau odorant* (Caius 1986)) has been used in beers, to scent the snuff a' la violette, and as an addition to some perfumes (Barton and Castle 1877).

Germany. The German names for the plant are *ackermagen*, *deutscher ingber*, *gewuerzkalmus*, *kalmus*, *karmes*, *karmsen*, *kaumeles*, *kolmas*, *magenwurz*, *nagenwurz*, *schienen*, *schienenwurz*, *wechel*, and *zehr-wurzhizome* (Caius 1986). The rhizome has been sold as a "quack" emmenagogue (Kantor 1916) and as treatment of gastrointestinal ailments (Herrmann 1956). A recent immigrant from Germany recalls the plant being used as incense during Easter in the Lutheran church during the 1950s.

Holland. Children chew the rhizome like a gum and make pop-gun projectiles out of it (Grieve 1971). In the Netherlands the plant is called *kalmus* and *zwanenbrood* (Caius 1986).

India, Pakistan and Ceylon. *Acorus calamus* is called *bach*, *ghorabach*, and *safed-bach* in Hindi, *themepri* in Assamese, *bach* in Bengali, *ganghilovaj* in Gujarati, *bajegida* in Kannada, *vashampe* in Malayalam, *vekhand* in Marathi, *bhuta-nashini* in Sanskrit, *vasambu* in Tamil, and *vasa* in Telugu (Jain 1968). The rhizome is used as an aromatic stimulant, an expectorant, an emmenagogue, a bitter tonic, a carminative, an antispasmodic, an emetic, a laxative, a diuretic (Dastur 1951), a central nervous system relaxant, a stomachic (Satyavati, Raina, and Sharmal 1976), an appetite stimulant, an anthelmintic, a vermifuge, an antibacterial agent, a sedative, an analgesic (Jain 1968), and a contraceptive (Malhi and Trivedi 1972). It is also used for ailments such as mouth and throat diseases, fevers, epilepsy, bronchitis, delirium, hysteria, tumors, thirst, memory loss, rat bites, ear worms, general weakness, toothaches, pains of the chest and kidneys, leucoderma (Kirtikar, Basu, and I. C. S. 1975), asthma, diarrhea, dysentery, flatulence (Jain 1968), dyspepsia (Wren 1956), indolent ulcers (Dastur 1951), rheumatism (Arseculeratne, Gunatilaka, and Panabokke 1985), and to increase the rate of catabolism (Lewis and Elvin-Lewis 1977).

Dastur (1951) states that in the treatment of children an infusion of the rhizome is given to aid in the relief of choleric diarrhea, dysentery, bronchitis, cough, fever, dyspepsia, epilepsy, and intestinal worms. He also states that the burnt rhizome is given to infants for

diarrhea, teething, colic, and as an emetic, and that the oil is used as an expectorant and relieves asthma, dysentery, loss of appetite, catarrh, ague, and hysteria. Dastur also mentions its use as a mild stimulant in typhoid cases, and a preparation mixing sweet flag with *Cinchona* L. bark for intermittent fever. The oil is given to hemorrhaging women after an abortion, and it is also used as a vermifuge to counteract croton poisoning. Mixed with saffron and mare's milk, it is administered to hasten delivery during childbirth. The rhizome is sucked as a lozenge for coughs, sore throat, and to clear the voice. A poultice of the burnt rhizome is mixed with castor oil or coconut oil, and milk or cashew spirit, for the treatment of abdominal cramps, paralyzed limbs, and rheumatic swellings.

In times of epidemics the rhizome was chewed to protect the user from disease (Barton and Castle 1877). It was also thought to be an aphrodisiac (Petelot 1954). The markets of India sell the candied "root," which can be eaten as a confection or used as a spice substitute for ginger (Meyer 1970). A hair perfume is prepared from the powdered rhizome (Ruegg 1936).

The plant has also been used as an insecticide to repel fleas and protect clothes and grain from moths (Watt and Breyer-Brandwijk 1962) and the powder was sprinkled around the bases of trees to protect them from infestation by white ants (Dastur 1951).

The rhizome, mixed with garlic, cumin seeds, salt, sugar, and butter, was used in veterinary medicine to strengthen horses. It is one of the ingredients used in the treatment of foot-and-mouth disease (Watt 1908) and the plant was believed to have a narcotic effect on cobras (Watt and Breyer-Brandwijk 1962).

Tibet. Dried sweet flag, mixed with *Ferula foetida* (Bunge) Regel, *Zingiber officinale* Rosc., *Cuminum cyminum* L., *Terminalia chebula* Retz., *Inula racemosa* Hook., and *Saussurea lappa* C. B. Clarke, is used to treat choleric diarrhea, chronic fever, heaviness of the stomach, and phantom tumor (Lama and Santra 1979). The dried plant is used in cancer cases (Burang 1979), and in Nepal the rhizome is valued for its use against colds, coughs, bronchitis, and nervousness (Singh et al. 1979).

Indonesia. Sweet flag has been used to treat diarrhea, as a postpartum to "purify" women after childbirth, and to rid the body of lice (Hirschhorn 1983).

The Isle of Man. Manxmen, on holidays, strew the floors of houses with the leaves of sweet flag (Gibbons 1962).

Java. The rhizome is taken after childbirth to increase the flow of milk (Burkill 1966).

Lithuania. The rhizome has been preserved as a sugar confection and the young leaves eaten by children (Grieve 1971). The Lettish people drank a brandy extract of the rhizome for chest pain and diarrhea. The leaves have been added to baths to relieve pain, sterility, gout, and rheumatism. The leaves were placed in beds to rid them of fleas (Ruegg 1936).

New Guinea. Sweet flag has been used to induce abortions (Krochmal and Krochmal 1975).

Philippines. Sweet flag has been valued as a diaphoretic, an antidyspeptic (Diguangco 1950), a stimulant, a carminative, and as an embrocation in rheumatism (Watt and Breyer-Brandwijk 1962). Powdered rhizome has been used in sachets and toilet preparations (Diguangco 1950). Local names for the plant include *lubigan*, *acoro*, *bueng*, *dálau*, *dárau*, and *déngau* (Quisumbing 1951).

Russia. The rhizome was used to cure typhoid fever, cholera, syphilis (Ruegg 1936), and baldness (El'Yashevych and Cholii 1972).

South Africa. Watt and Breyer-Brandwijk (1962) state that the white population uses sweet flag as a carminative, a stomachic, an antidiarrheal, a tonic, a tooth powder, and an aphrodisiac.

Sweden. A rhizome extract of the plant they call *kalmus* has been used in corn spirits (Barton and Castle 1877).

Thailand. The rhizome has been taken for blood purification and as an antipyretic (Mokkhasamit et al. 1971).

Turkey. The oil of the rhizome has been used as an antiseptic to prevent infection (Ruegg 1936). The candied or fresh rhizome has been chewed as a confection, a stomachic (Harris 1972), and to aid dyspeptic patients (Wren 1956). Baked, the rhizome has been used for coughs, tuberculosis (Ruegg 1936), and as a preventive medicine during epidemics (Barton and Castle 1877). In Istanbul the rhizome was a confection and stomachic, and was eaten during epidemics as a preventive medicine (Lindley 1838).

United States. The rhizome is used for stomach cramps, flatulence, and as a stimulant tonic (Dobelis 1986). Chewed raw or candied, it clears phlegm from the throat (Krochmal and Krochmal 1975), is used to treat indigestion and heartburn, and as a carminative (Elliott 1976). It is also employed for appetite loss, biliary upsets, liver disorders, exhaustion, weakness (Thomson 1978), high cholesterol (Harris 1972), diarrhea, fevers (Ludlow 1924), suppressed menses (Tantaquidgeon 1972), malaria (Ruegg 1936), and toothaches (Hussey 1974). It is used as a vermifuge (Malpass 1945), an antiseptic, an antiprotozoal agent, a central nervous system stimulant, a sedative, an analgesic, a tonic for lowering blood pressure and respiration (Watt and Breyer-Brandwijk 1962), and, in Missouri, as an abortifacient (Weiner 1972). Dropsy, peritonitis (Bethel 1972), hyperacidity, and pyrosis are also said to be cured by the rhizome.

Sweet flag is high in potassium, which has suggested its use in the relief of illnesses which have been attributed to potassium deficiency, such as asthma, hay fever, hiccups, and muscular dystrophy. The phosphorus and potassium in the plant also aid in pain relief (Bethel 1972). Harris (1972) remarks that the rhizome stores unused carotene, which is converted to vitamin A and

can be used to treat eye problems. The sulfur content in the rhizome has been suggested as favorable for bone growth, blood clotting, muscle metabolism, and to counteract toxic substances in the body (Lust 1974).

Externally the rhizome is used to wash sores, burns (Elliott 1976), and indolent ulcers (Morton 1974). In a bath the plant has been used for rickets, scrofula, paralysis, gout (Ruegg 1936), poor circulation, chilblains, low blood pressure, and general tiredness (Lust 1974).

The powdered rhizome was smoked or chewed to help smokers quit cigarettes (Dobelis 1986) and was sprinkled on shelves or in closets to repel insects and protect clothes and books (Barton and Castle 1877).

The oil is used to flavor cordials, liquors, gin, beer, wine, bitters, and perfumes (Uphof 1968); Vermouth de Turin and Eceu-de-view de Dantzic are examples of liquors flavored with the oil (Ruegg 1936). The oil has fixative properties, which help retain and prolong the aromatic principles of other oils (Meyer 1970).

In Boston the candied rhizome has been chewed to sweeten the breath (Hedrick 1919). The tender new leaves are used in wild salads (Angier 1974), broths, and stews, to flavor fish, and as an additive spice to flavor vinegar (Harris 1972). Loewenfeld and Back (1974) state that some types of creams and custards also contain sweet flag in the flavoring.

In some western states the oil of sweet flag is used in the tanning of leather (Morton 1974). Because of its aromatic odor the plant is used in potpourris (Rose 1974) and sachets (Bethel 1972). *Salmon's Herbal* reported that the juice of sweet flag could be used to "prevail against the bitings of mad dogs and other venomous creatures" (Grieve 1971).

American Indians. Throughout its range sweet flag is used as a cold remedy, cough medicine, general tonic, pain killer for colic, stomach cramps, sore throat, toothache (Moerman 1981), fever, menstrual problems (Dobelis 1986), flatulence, stimulant (Krochmal and Krochmal 1975), kidney problems (Coon 1960), and as an abortant (Weiner 1972). A single dose is a piece of the raw rhizome as big as the first finger joint. The juice of the plant is rubbed directly onto burns and was snuffed for a catarrh (Coon 1960). To relieve fever, coughs, and toothaches the rhizome is mixed with willow bark (Hussey 1974). Sweet flag is considered by many tribes as a cure-all (Johnson 1970) and was used as a medium of exchange (Dobelis 1986).

The Cree of Alberta, Canada, are said always to have carried some of the rhizome in their medicine bundles (Johnson 1970), and they chewed it daily to maintain good health (Anonymous 1981) and prevent fatigue. One daily dose is about 1–2 inches of the rhizome, and ten inches are to be consumed to induce hallucinations (Ott 1975). *Wehkes* (muskrat root), as they call it, is used to treat colds, toothaches, stomach problems (Anonymous 1972), coughs (Kirtikar, Basu, and I. C. S. 1975), cholera (Chandler, Freeman, and Hooper 1979),

sore throat, and, when it is mixed with tobacco and smoked, headaches (Johnson 1970).

The Potawatomis snuff the powdered rhizome to stop nasal drip (Weiner 1972) and treat catarrh, and inhale the smoked rhizome to cure colds (Lewis and Elvin-Lewis 1977).

The Blood Indians, who obtained the rhizome from the Kootenai tribe, call it *Pow-e-men-artic* (fire root, bitter pepper root, fish backbone, muskrat root), and use it to relieve coughs and treat liver ailments (Anonymous 1972).

The Meskwakis use the boiled rhizomes on burns and sores (Weiner 1972). The Meskwakis and the Omaha tribe feed the plant to ailing horses (Watt and Breyer-Brandwijk 1962). Kindscher (1987) states that the Omaha eat the boiled rhizome for food.

The Pawnee call the plant *kahtsha itu* (medicine lying in water). The Osage call it *peze boao ka* (flat herb) and the Lakota name is *sinkpe tawote* (muskrat food root) or *sunkace* (dog penis). The Pawnee use a garland of the leaves in sacred ceremonies, and both they and the Lakota braid the leaves into necklaces when they come across the plant during hunts. The Lakota eat all parts of the plant as a salad and the Osage chew the rhizome for flavor (Kindscher 1987). The Dakota, Omaha, Pawnee, and Winnebago tribes all chew the rhizome to soothe toothaches and coughs, and drink it as a tea to lower fevers (Moerman 1981). Dakota warriors chewed the rhizome into a paste and rubbed that onto their faces in the belief that this makes them calm and unafraid in the face of danger during war (Elliott 1976).

On the Sisseton Indian Reservation in South Dakota sweet flag rhizome is mixed in a decoction with another plant root, the identity of which was not revealed, to take the place of insulin (Fielder 1975).

Sweet flag, thought to be a panacea by the Micmac, Cheyenne, and Mohecan, was used to prevent illness and to help ill people regain their strength (Moerman 1981). The Cheyenne used the plant as a diuretic and laxative (Hart 1981) and tied a piece of the rhizome to their children's pajamas to keep the "night spirits" away (Moerman 1981).

The Chippewa called the plant *wiken* or *nabuguck* (Densmore 1974) and snuffed the ground rhizome and drank a tea made from the rhizome to treat colds. The tea was gargled for sore throats (Moerman 1981) and the rhizome used as a physic and cure for toothaches. The Chippewa combined sweet flag with *Aralia nudicaulis* L. in a decoction that was used as a charm on fishing nets and to ward off rattlesnakes (Densmore 1974).

Penobscot Indians held sweet flag to be a panacea (Speck 1917), the Kentucky Algonquin used the plant to induce menstruation (Bolyard 1978), and the Pillager Ojibwas drank the rhizome tea for colds and throat problems (Weiner 1972). Plant parts of sweet flag were discovered in the caves of the Ozark Bluff-dwellers,

evidence that sweet flag was used by them (Kindscher 1987).

Yugoslavia. Peasants have used sweet flag to induce abortions (Krochmal and Krochmal 1975), clear the voice (Barton and Castle 1877), and powdered to toilet powders, and sachets (Hill 1952).

REVIEW OF EXPERIMENTAL DATA

The cortex of the rhizome of *Acorus* has been shown to act as an antispasmodic agent in guinea pig ileums (Itokawa et al. 1983). A dried extract from *Acorus* was reported by Dash, Tripathi, and Singh (1983) to have psychotropic activity in humans and to be an effective antifungal agent against the species *Botrytis cinerea* Pers. and *Trichophytum mentagrophytes* (Robin) Blanch. The extract was ineffective against the fungal species *Aspergillus fumigatus* Fres., *Aspergillus niger* Van Tieg, *Candida albicans* (Robin) Berkhout., *Fusarium oxysporum* Schlecht., *Rhizopus nigricans* Ehren., *Penicillium digitatum* Sacc., and *Saccharomyces pastorianus* Hansen.

The essential oil of sweet flag had positive results as an antibacterial agent against *Bacillus pumilus* Meyer & Gottheil in Gottheil, *Bacillus subtilis* (Ehrenberg) Cohn, *Escherichia coli* (Migula) Castellani & Chalmers, *Corynebacterium diphtheriae* (Krause) Lehmann & Neumann, *Pseudomonas solacearum* (Smith) Smith, *Salmonella typhosa* Borman, Stuart & Wheeler, *Sarcina lutea* Pansini, *Shigella diphtheriae* (Shiga) Castellani & Chalmers, *Staphylococcus albus* Rosenbach, *Staphylococcus aureus* Rosenbach, *Streptococcus faecalis* Andrews & Horder, *Streptococcus pyogenes* Rosenbach, and *Vibrio cholera* Pacini. The essential oil was inactive on *Pseudomonas aeruginosa* (Schroeter) Migula (Kar and Jain 1971). The oil was reported to be an effective antifungal agent on *Alternaria tenuis* Nees (Arora and Pandey 1984), *Aspergillus fumigatus*, *A. nidulans* Eidam, *A. oryzae* (Ahlb.) Cohn (Alankararao and Rajendra Prasad 1981), *Diplodia natalensis* Evans (Arora and Pandey 1984), *Penicillium digitatum*, *P. italicum* Wehmer, and *Phomopsis destuctum* Rao, Agarwal & Saxena (Alankararao and Rajendra Prasad 1981). *Acorus* oil affects spasmolytic activity in rabbit intestines (Kar and Jain 1971) and aorta, as well as in rat intestines and uteri (Maj, Malec, and Lastowski 1966). It is reported effective as an antileech agent (Saxena, Khalsa, and Pillai 1969), for hypotensive relief in cats (Kar and Jain 1971), and as an anticonvulsant in pregnant mice, but

was ineffective on male mice (Khare and Sharma 1982).

The dried rhizome of *Acorus* has been reported as an effective antibacterial agent for *Bacillus subtilis* (Janssen et al. 1986; Pongpan, Chumsri, and Taworasate 1982), *B. proteus* Trevisan, *Escherichia coli* (Alankararao and Rajendra Prasad 1981; Janssen et al. 1986), *Hemophilus pertussis* Holland, *Shigella dysenteriae* (Shiga) Castellani & Chalmers (Alankararao and Rajendra Prasad 1981; Chopra, Khajuria, and Chopra 1957), *Staphylococcus aureus* (Janssen et al. 1986), *Streptococcus pneumoniae* (Klein) Chester and *Vibrio cholera* (Chopra, Khajuria, and Chopra 1957), but is ineffective on *Bacillus subtilis* (Ishii et al. 1984; Mokkhasamit et al. 1971; Ray and Majumdar 1976), *Enterobacter agglomerans* (Beijerinck) Ewing & Fife (Grabowska and Kedzia 1982), *Escherichia coli* (Ishii et al. 1984; Mokkhasamit et al. 1971), *Mycobacterium tuberculosis* (Zopf) Lehmann & Neumann (Bhakuni et al. 1969), *Pseudomonas aeruginosa* (Janssen et al. 1986), *Salmonella typhosa* (Avirutnant and Pongpan 1983; Ray and Majumdar 1976), *Shigella dysenteriae* (Avirutnant and Pongpan 1983), *Staphylococcus aureus* (Avirutnant and Pongpan 1983; Bhakuni et al. 1969; Chopra, Khajuria, and Chopra 1957; Mukerjea and Govind 1960; Ray and Majumdar 1976), *Streptococcus pyogenes* (Chopra, Khajuria, and Chopra 1957), and *Vibrio cholera* (Ray and Majumdar 1976).

As an antifungal agent, the dried rhizome is active against *Candida albicans* (Janssen et al. 1986), *Lenzites trabea* Pers.:Fr. [= *Gloeophyllum trabeum* (Fr.) Murrill], *Lentinus lepideus* (Fr.:Fr.) Fr., and *Polyporus versicolor* L.:Fr. [= *Trametes versicolor* (L.:Fr.) Pilat.] (Maruzzella, Scrandis, and Grabon 1960), and inactive against *Aspergillus niger* (Ray and Majumdar 1976), *Candida albicans* (Avirutnant and Pongpan 1983; Ray and Majumdar 1976), *Saccharomyces cerevisiae* Hansen, *Trichophytum mentagrophytes*, *Trichophytum rubrum* (Cast.) Sabour. (Ray and Majumdar 1976) and the potato pest *Phytophthora infestans* (Mont.) de Bary (Yang and Tang 1988).

The dried rhizome has insecticidal properties that are active upon *Aedes aegypti* L. (Dixit, Perti, and Agarwal 1965), *Anopheles maculipennis* Meig. (Mironov 1940; Yang and Tang 1988), *Bombyx mori* L. (Mukerjea and Govind 1959, 1960), *Bruchus chinensis* L. (Yadava 1971), *Chilo suppressalis* Walker (Yang and Tang 1988), *Dacus cucurbitae* Coq. (Kaul and Bhatia 1965), *Dys-*

dercus koenigii F. (Bhaskar et al. 1977; Bhaskar, Saxena, and Srivastava 1972; Koul, Tikku, and Saxena 1976; Saxena et al. 1977), *Henosepilachina vigintiotopunctata* F. (Tewari and Krishna-Moorthy 1985), *Heterotermes indicola* Wasmann, *Letheticus oryzae* Waterhouse (Paul, Agarwal, and Ausat 1965), *Musca domestica* L. (Chopra, Khajuria, and Chopra 1957; Mironov 1940; Mukerjee and Govind 1959, 1960; Saxena and Mathur 1976), *Nephotettix impicticeps* Ishihara, *Rhopalosiphum maidis* F. (Yang and Tang 1988), *Sitotroga cerealella* Oliver (Abraham et al. 1972), *Sitophilus oryzae* L. (Paul, Agarwal, and Ausat 1965), *Spodoptera litura* F. (Yajima, Kato, and Munakata 1977), *Tetranychus urticae* Koch (Yang and Tang 1988), *Thermobia domestica* Packard (Motl, Rohdendorf, and Saxena 1975), and *Tribolium castaneum* Herbst (Paul, Agarwal, and Ausat 1965), but is inactive on *Ixodes ricinus* L. (Mironov 1940). Subrahmanyan (1942) also reported the rhizome powder effective against bird-lice, bed bugs, and clothes moths.

The dried rhizome exhibited no antiviral activity when tested on Influenza A2, Herpes virus type, Polio virus II, and Vaccinia (Bhakuni et al. 1969; May and Willuhn 1978). It also lacked antitumor activity when tested on Leuk-L1210 and Sarcoma-WM256 (Bhakuni et al. 1969). The rhizome gave positive results as an antiamebic agent when tested on *Paramecium caudatum* Ehrbg. (Chopra, Khajuria, and Chopra 1957) and negative results for *Endameba histolytica* Schaudinn (Bhakuni et al. 1969). The nematode *Ascaris lumbricoides* L. was controlled by the dried sweet flag rhizome (Feroz, Khare, and Srivastava 1982; Kokate et al. 1980). The rhizome was found to have mutagenic activity on *Salmonella typhimurium* (Loeffler) Castellani & Chalmers (Goggelmann and Schimmer 1983) and antifolic activity on *Lactobacillus casei* (Orla-Jansen) Hansen & Lessel (Patil, Chitre, and Sheth 1966).

When tested on laboratory animals, the dried rhizome was effective as an antispasmodic (Bhakuni et al. 1969; Bose et al. 1960; Dandiya and Cullumbine 1959; Das, Malhotra, and Dhalla 1962; Keller, Odenthal, and Leng-Peschlow 1985; Updyke 1977), an antihistamine (Updyke 1977), an anticonvulsant (Agarwal et al. 1956; Athanassova, Shopova, and Roussinov 1965; Khare and Sharma 1982), an antipyretic (Maj, Lastowski, and Lukowski 1965), a neuroleptic enhancer (Dandiya and Cullumbine 1959; Dan-

diya, Cullumbine, and Sellers 1959; Dhalla and Bhattacharya 1968; Malhotra et al. 1961; Malhotra, Das, and Dhalla 1962), a central nervous system depressant (Agarwal et al. 1956; Bhattacharya 1968; Dandiya, Baxter, and Cullumbine 1958; Dandiya and Cullumbine 1959; Dandiya et al. 1959; Dasgupta, Patra, and Sikdar 1977; Maj, Danuta, and Lastowski 1964; Maj, Lastowski, and Lukowski 1965; Shipotshliev 1968), a convulsant (Chopra, Khajuria, and Chopra 1957; Dandiya and Cullumbine 1959; Meunier and Cadeac 1890), a smooth muscle relaxant (Agarwal et al. 1956; Das, Malhotra, and Dhalla 1962), and a uterine relaxer (Dandiya, Cullumbine, and Sellers 1959; Das, Malhotra, and Dhalla 1962; Updyke 1977); it also acted as a carcinogen (Goddard 1968; Taylor et al. 1967; Updyke 1977). The rhizome also shows activity as a hypothermic (Bhakuni et al. 1969; Dandiya and Cullumbine 1959; Maj, Danuta, and Lastowski 1964), a hypotensive (Agarwal et al. 1956; Bose et al. 1960; Dandiya and Cullumbine 1959; Maj, Danuta, and Lastowski 1964; Maj, Lastowski, and Lukowski 1965; Mokkhasamit et al. 1971), an analgesic (Agarwal et al. 1956; Maj, Danuta, and Lastowski 1964), an anti-inflammatory (Vijayasathya, Sharma, and Prakash 1981), a bronchodilator (Bose et al. 1960), a hepatotoxin (Taylor et al. 1967; Updyke 1977), a respiration inhibitor (Dhalla, Malhotra, and Sastry 1961), an antifibrillator (Madan, Arora, and Kapila 1960), and, in frogs, a cardiac depressant (Bose et al. 1960) and an inducer of positive and negative inotropic effects (Agarwal et al. 1956).

Further research on laboratory animals has shown the dried *Acorus* rhizome to be inactive as an antispasmodic, an antihistamine (Mokkhasamit et al. 1971), an anticonvulsant (Bhakuni et al. 1969; Dandiya and Cullumbine 1959; Maj, Lastowski, and Lukowski 1965), an antipyretic (Nikonorow 1939), a smooth muscle relaxant (Dandiya and Cullumbine 1959) or a neuroleptic effect enhancer (Dey, Bose, and Mitra 1976). Studies on the antihistamine (Keller, Odenthal, and Leng-Peschlow 1985) and anticonvulsant activity (Madan, Arora, and Kapila 1960) yielded mixed results.

The dried rhizome showed negative results when tested as an antihypoglycemic agent (Bhakuni et al. 1969), a cytotoxic agent (Bhakuni et al. 1969; May and Willuhn 1978), a hypotensive (Bhakuni et al. 1969), an analgesic (Bhakuni et al. 1969; Chow, Chen, and Yang 1976), a diuretic

(Bhakuni et al. 1969; Maj, Lastowski, and Lukowski 1965), a circulation stimulant (Ohmoto et al. 1985), a plaque suppressant (Namba et al. 1985), an anti-implantation agent (Dhar, Gupta, and Chandhoke 1978), an embryotoxin (Prakash 1986), a barbiturate (Dandiya, Cullumbine, and Sellers 1959), a smooth muscle stimulant (Dandiya and Cullumbine 1959), an irritant, a photosensitizer, a skin sensitizer, or an enhancer of cutaneous absorption (Updyke 1977).

CONCLUSIONS

Sweet flag has had a long history and numerous traditional economic and ethnobotanical applications. Its story dates back to the time in the Bible when Moses used the plant in a holy anointing oil. Sweet flag was included in many of the early herbals and has a rich history in the Chinese and Indian cultures. Very few plants have gained such widespread use in diverse cultures. This suggests that the pleasantness of aromatic constituents or the positive medicinal attributes associated with sweet flag had enough validity to allow its use to surpass cultural barriers and gain widespread usage.

Contemporary use involves the alkaloids and oils produced mainly in the rhizome. They have been tested on many microorganisms and conditions that the plant has been used to treat and there are indications that the plant may have applications for some ailments for which the plant has a historical record of use. Although further testing is needed, it appears, based on the evidence of these studies and historical use, that sweet flag may still have some beneficial applications in modern medicine.

Sweet flag is used today in perfumes, pot-pourris, and in flavoring alcoholic beverages and vinegar. But the use is limited due to the carcinogenic alkaloid β -asarone present in the extract. The diploid varieties have been found to be "asarone free," so by proper horticultural selection of quality oil producing diploid varieties, the use of the oil as a flavoring agent could increase its production and use to the levels it maintained prior to the U.S. and Canadian prohibition of the oil.

Its oils are being employed as antifungal and antibacterial agents which suggests further investigation for commercial exploitation as an organic pesticide. Its medicinal values, its use as a flavoring ingredient, and as a natural pesticide

are areas in which continuing research is needed, and could prove valuable to medicine and agriculture.

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BOOK REVIEW

Wild Plants of Barbados. Sean Carrington. 1993. The Macmillan Press Ltd., London and Basingstoke. 128 pp. (paperback). \$20.00 ISBN 0-333-56560-6.

This excellent reference brings a fresh and clear approach to the flora of a Caribbean island. There are two useful maps, the first of Barbados showing the plant communities found on the island, and the second showing the New World geographic zones used to define distribution of plants described in this book.

Wild Plants of Barbados starts with a historical review of the flora of Barbados, and then goes through an orderly process of how to use this work. Plant classification is based on the system used by Engler and Prantl, and this is made easy by the author's description of family characteristics, along with an easy-to-read layout of information for each plant entry.

What follows is a clear and informative 'mini botanical' course as the author guides the reader through the steps required to identify a plant. These steps are accompanied by clear line drawings. An added feature is the author's simple approach toward recognizing major plant groups and key families. While he follows the traditional botanical format of plant classification, he makes the process of identification simple enough for even the most uninitiated of readers. This introduction is useful in itself as an outdoor class, which indeed the

author teaches as Senior Lecturer in Plant Biology at the University of the West Indies in Barbados.

The author makes the descriptions of each plant simple enough to avoid having to constantly refer to the Glossary at the back of the book. Also included are interesting notes about the uses of the plants. In addition, the reader is given a 'Quick Guide' through some of the major plant families and their particular characteristics, which is especially useful when one is trying to identify several plants at once. The photographs are all exceptionally clear and of a consistently fine quality.

There is a useful Reference section in the back of the book. The author has provided an Appendix for the reader who wishes to compare the coverage in this reference with that in *Flora of Barbados* (now out of print). Carrington has expressed the hope that the prevailing attitude of dismissing the plants around us as 'just bush' will change to one of 'renewed interest and respect' with this book. I believe that he will succeed in this endeavor.

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The Mahāvīra Vessel and the Plant Pūtika

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THE MAHĀVĪRA VESSEL AND THE PLANT PŪTIKA

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The Pravargya sacrifice is centered in the making and the worship of a non-iconic earthen pot, the Mahāvīra vessel. The ritual enacts an initiation through a craft, the craft of the potter. The vessel, made to glow in the sacrificial fire is the "all encompassing hero," Mahāvīra, the Sun.

The vessel is the head of the sacrifice, the Head of Makha. Makha however is the cosmic giant. The myth of the decapitation of Makha and the restoration of its head to the sacrifice rest on a secret magic knowledge, the mystery of Soma.

In the Pravargya the mantle of King Soma has fallen on the shoulders of Emperor Mahāvīra—and the myth of the Soma plant has been substituted by that of the plant, Pūtika. The odour of this plant, an ingredient of the Mahāvīra pot, is of great significance in myth and ritual. The name of the plant, Pūtika, survives to this day in the name "Putka" which is that of a mushroom sacred to the Santal, an aboriginal tribe in Eastern India. The mushroom Pūtika is the mythically and ritually authenticated substitute of Soma. This makes it more than likely that the Soma plant itself was a mushroom.

The symbolism of the Mahāvīra vessel, as the Sun, the "all seeing eye," on the other hand survives in representations of the auspicious vase in Western Indian paintings preserved from the fifteenth century A.D.

THE MAHĀVĪRA VESSEL is an anointed, empty earthen pot glowing red hot in the sacrificial fire. Its function, in the first and original part of the Pravargya rite of which it is the center, is symbolic. It is only in the second and subsequent parts of this rite that the vessel will be filled with milk, that it will be replete with perceptible contents.

Pravargya means that "which is to be put on the fire," viz. the Mahāvīra vessel. In the later Vedic age, in the White Yajurveda, the Pravargya sacrifice had been combined with the Ṛg Vedic Soma sacrifice, the Pravargya being performed just before or at the beginning of the Soma sacrifice. Myth and ritual of the two sacrifices were coordinated in one configuration. The head of this configuration is called the Head of Makha.

The Head of Makha of which the Mahāvīra vessel (*ukhā*) is the symbol, is the main and central sacred object of the Pravargya sacrifice. The vessel is made of clay to which four other ingredients are added. Pūtika plants are one of them and their significance is paramount in the myth and ritual of the Head of Makha. The Pravargya sac-

rifice requires a special initiation over and above that of the Soma sacrifice and it must not be performed by one who for the first time offers a Soma sacrifice (ŚB.14.2.2.44-46; Āp.ŚS.15.20-21).

THE SECRET OF THE CUT-OFF HEADS

The myth of the Mahāvīra vessel is told in several versions, that of the Śatapatha Brāhmaṇa being the most exhaustive:

The gods, Agni, Indra, Soma, Makha, Viṣṇu, and the Viśve Devāḥ perform a sacrificial session in Kurukṣetra in order to win glory. They agree that whoever amongst them through austerity, fervour, faith, sacrifice and oblations would first encompass the end of the sacrifice would be the most excellent among them and the glory should then be common to them all. Viṣṇu obtained it (ŚB.14.1.1-5).

Viṣṇu is the sacrifice. But Viṣṇu was unable to contain the love of glory of his (ŚB.14.1.6).

Taking his bow with three arrows he stepped forth and rested his head on the bow. Then the termites of the Upadika kind gnawed the bowstring, it was cut, the ends of the bow

springing asunder cut off Viṣṇu's head (ŚB.14.1.1.7).

It fell and became the Sun. The rest of the body lay stretched out with the top towards east (ŚB.14.1.1.10).

The gods said: Our all-encompassing hero (*mahān vīraḥ*) has fallen. Therefrom the Mahāvira vessel was named, and the vital sap (that flowed from him) they wiped with their hands (*sam-mṛj*). Whence the Mahāvira is the Samrāj (the emperor) (ŚB.14.1.1.11).

The gods rushed forward to him, Indra applied himself to him, limb to limb, engulfed, encompassed him and became possessed of his glory [i.e. of that of the headless Viṣṇu] (ŚB.14.1.1.12).

The gods went on worshipping with that headless sacrifice (ŚB.14.1.1.17).

Dadhyañc Ātharvaṇa knew this pure essence (the Madhu, the sweet [and secret] knowledge of the Pravargya), how the head of the sacrifice is put on again; how the sacrifice becomes complete again (ŚB.14.1.1.18 [cf.4.1.5.18]).

Indra threatens to cut off the head of Dadhyañc if he divulges the secret to anyone else [for Indra had obtained only the glory of the headless body.] (ŚB.14.1.1.19).

The Aśvins hear this and offer themselves as disciples to Dadhyañc (ŚB.14.1.1.20).

Dadhyañc refuses them, fearing Indra would cut off his head (ŚB.14.1.1.21).

However the Aśvins promise to protect Dadhyañc by the following scheme: when Dadhyañc would receive them as pupils they would cut off his head and replace it by a horse's head. Dadhyañc will teach them through a horse's head—which head Indra will cut off. Then they will replace Dadhyañc's own head (ŚB.14.1.1.22-24).

Dadhyañc Ātharvaṇa with a horse's head taught them the sweet [secret] (ŚB.14.1.1.25).

The god who does not honour an agreement and arrogantly keeps to himself the glory he undertook to share with the other gods is beheaded by his own bow. The decapitated god is Viṣṇu, in the Śatapatha Brāhmaṇa. His name is Makha in the Tāṇḍya Brāhmaṇa while in the Taittirīya Āraṇyaka he is called Makha Vaiṣṇava.¹ He is

also called Makha Saumya (in ŚB.14.1.2.17). Viṣṇu and Makha are equated, they are one person for Viṣṇu is the sacrifice (ŚB.14.1.1.6) and Makha is the same as Viṣṇu (ŚB.14.1.1.13). Viṣṇu is particularly the Soma sacrifice.

Except in the above story, Makha does not figure amongst the gods. Makha's head however is invoked in Taitt.S.1.1.8. and it is the very center of the Pravargya sacrifice. Makha's head means the Sun (ŚB.14.1.1.10) and has for its symbol the Mahāvira vessel. Mahāvira is here being translated as "all encompassing hero," with reference to the sun,² but also with regard to Makha whose cutoff head is restored by the Pravargya ritual to the sacrifice.³ Makha, in the ŚB. is the deific name of the sacrifice.⁴ The Sacrifice had its head cut off. Its headless body lies prostrate. This fallen hero is reconstituted by having his head sacrificially joined by the Pravargya ritual to the body, that is to the basic Soma sacrifice.

Who but Viṣṇu or Makha among the gods could encompass to its end the sacrifice? For Makha himself is the sacrifice and Viṣṇu is the sacrifice; subject and object are one. In its deific shape, as Makha or Viṣṇu, the sacrifice is the main figure in the myth. The myth is acted out in the form of the ritual. The meaning of the sacrificial myth, the staging and action of the sacrificial ritual, aim at the atonement of an initial wrong and at reintegration. In the present myth an arrogantly broken pledge is the initial wrong, the departure from integrity, a broken promise out of self-seeking niggardly pride. This initial disintegration that causes Viṣṇu-Makha, the sacrifice, to lose its head, wants to be undone by a reintegration, which is the purpose of the rites of the sacrifice.

The Pravargya sacrifice is added on to the beginning, or precedes the Soma sacrifice. The

10.171.2 "Indra severed Makha's head from the skin" (body; and Taitt.S.1.1.8.)

² J. A. B. van Buitenen, *The Pravargya*, Poona 1968, 35, translates Mahāvira as "Large Man." The largeness being that of the sun, does not refer to its size, but to its all-encompassing power.

³ Pravargya is "that which is to be put on the fire," L. Renou, *Vocabulaire du Rituel Védique*, Paris, 1954, 111; i.e. the Mahāvira pot.

⁴ Makha has been variously translated; M. Mayrhofer, *A Concise Etymological Sanskrit Dictionary*, Heidelberg 1963, s.v. "Sacrifice" and "Hero," both fit Makha in the present context.

¹ Tāṇḍya B.7.5.6; Taitt. Ār. 1.1-7; Śatapatha B.14.1.1-5; 14.1.2.17, a different version in Ait.B. I.19; cf. RV.

Pravargya is not known to the Ṛg Veda. It appears to have been a sacrifice originally independent of the Soma sacrifice. The two conjoint sacrifices have their mythical figure in Makha, the Pravargya being Makha's head. Its symbol is the Mahāvīra pot.

The Soma sacrifice has Viṣṇu for its mythical figure. When the Pravargya sacrifice is added to the Soma sacrifice, they form as it were one sacrifice of which the Pravargya is the head, Makha's head. Forming one albeit extended sacrifice, Viṣṇu becomes equated with Makha. The Pravargya preceding the Soma sacrifice, being in front of the sacrifice, it is the "Head of Makha"; nowhere is it spoken of as Viṣṇu's head.

In the ŚB. version it was Viṣṇu who encompassed the entire sacrifice: this was his glory which identified him with the sacrifice. But in the elation of his triumph he literally lost his head. His bow cut it off. The head fell and became the sun. The rest of the body lay stretched out towards the east. In this calamitous situation, Indra encompassed the prostrate body, lay down on it; limb to limb he embraced it and its glory was absorbed by him. It was a truncated glory of a headless body. The gods went on worshipping with that headless sacrifice and gained nothing by it.

Truly, the gods were cheated by Viṣṇu of the glory of the sacrifice. Moreover the identities in the ŚB. story do not work out squarely. Viṣṇu is the sacrifice and he who is the sacrifice is the Sun (ŚB.14.1.1.6,32). In itself however, and not by synecdoche, the cut off head becomes the sun. It is Makha's head which is represented by the Mahāvīra pot in the Pravargya sacrifice (Vāj.S. 37.8; ŚB.14.1.2.1). One who teaches and partakes of the Pravargya sacrifice enters the light of the Sun (ŚB.14.1.1.26-32). By offering the Pravargya, the head of the sacrifice is replaced. (Tāṇḍya, 7.5.6, end)

Two equations hold good: Viṣṇu is the sacrifice; Makha is the Sun. The two conceptions are combined. They are linked in the ŚB. by the role of Indra. It is as problematic as it is imitative. It is moreover futile, for the gods sacrificing with the headless sacrifice do not obtain blessings. (Taitt.Ār.I.6) Dadhyañc, the Ātharvāna, the fire-priest, comes to their rescue by telling the Healers among the gods, the Aśvins, the "madhu-vidya," the "sweet" or secret magic knowledge how to replace the head of the sacrifice. The Aśvins, in possession of the secret knowledge, ask the gods

for a boon and receive it in the shape of a libation of hot milk (*gharma*) out of the Mahāvīra pot (Taitt.Ār.I.7). They promptly replace the head of the sacrifice. Henceforward, *Gharma*, Mahāvīra, Pravargya and "Makha's head" refer to the same complex reality. The Aśvins learned the Madhu Vidyā, the "sweet" secret knowledge straight from the "horse's mouth," for it was with a horse's head that Dadhyañc spoke to them (RV.1.119.9).

Now Indra had entered also this part of the story. He had cut off the head of Dadhyañc, that is the horse's head. (RV.1.84.14). Indra had to cut off the head which had divulged the secret to the Aśvins. In fact, Indra previously had threatened Dadhyañc that he would cut off his head should Dadhyañc ever betray the secret known only to Indra and Dadhyañc. By a ruse the Aśvins made Dadhyañc part with the secret and keep his head. That is, they themselves cut off Dadhyañc's original head and put on Dadhyañc a horse's head which told the secret. When Indra fulfilled his threat, he did cut off Dadhyañc's head but that was the head of the horse which had told the secret. Finally the Aśvins know how to restore the original head of Dadhyañc. This miraculous restoration these divine healers accomplished. Now, their knowledge further increased by the secret they had learned from the horse's head, they also knew how to restore the head of Makha. But did the "sweet," the Madhu, that only Indra and Dadhyañc⁵ knew and that Dadhyañc announced to the Aśvins through the horse's head remain unchanged from the Ṛg Veda to the Brāhmaṇas?

The Ṛg Veda speaks of the "sweet" (*madhu*) of Tvaṣṭṛ, it also speaks of the fly that gave away the Madhu, the "sweet" (RV.1.119.9). Tvaṣṭṛ's sweet is Soma. Indra once stole the Soma from Tvaṣṭṛ (RV.3.48.4), whereas the fly betrayed the secret to the Aśvins. In the ancient story of the Ṛg Veda, the secret of Soma is betrayed to the Aśvins, by Dadhyañc, or else it is betrayed to them by a fly.⁶

Was the "sweet" that Dadhyañc knew the knowledge of Soma and where the Soma could be found? The horse's head of Dadhyañc was submerged in Śāryānāvat.⁷ Śāryānāvat is a lake or river in the

⁵ RV.1.116.12; 1.117.22; 1.119.9; 9.68.5.

⁶ RV.1.119.9; R. Gordon Wasson, *Soma Divine Mushroom of Immortality*, The Hague, 1968, 61; K. F. Geldner, *Der Rig Veda*, I, p. 162, note on RV.1.119.9.

⁷ RV.1.84.14.

mountains of Kurukṣetra. It is rich in Soma.⁸ With the bone of that cutoff horse's head Indra slew nine times ninety arch enemies (Vṛtras).⁹ That bone served as Indra's Vajra, his unfailing weapon. It was the thunderbolt.¹⁰ The Madhu in the Ṛg Veda has the secret of Soma for its content. This secret, the repository of Indra's strength, is revealed by Dadhyañc to the Aśvins.

A later text¹¹ also tells us that Indra himself had imparted to Dadhyañc the magic secret (*brahma*) and had forbidden him to reveal it to anyone. This secret knowledge in post-Ṛg Vedic texts appears not to be the same pure essence, viz. Soma, the innermost mystery and life elixir of the sacrifice, but another carrier of sacrificial transport, viz. the secret of the Pravargya. This mystery is revealed to the Aśvins by the horse's head which was cut off by Indra. Another cutoff head, that of Makha and the life elixir which flowed away from the decapitated head of the sacrifice itself, have their own initiatory power. Soma, the drink of immortality, sweetness itself (*madhu*), is the original mystery.

The mystery now however is centered in the restoration of the head of Makha. The horse's head told the Aśvins the secret of how to restore the head of the sacrifice. The secret, however, shared originally by Indra and Dadhyañc is Soma. Secretly, by the horse's head, the sanctity of Soma was assigned to Makha's head in a duplicity of meaning, implying a transfer of significance from the Soma sacrifice to the Pravargya sacrifice. The Soma mystery is the primary secret. It is the "sweet" of Tvaṣṭṛ, the maker of all form, the mystery of creativity itself, of which the Ṛg Veda sings.

The secret given away by Dadhyañc Ātharvaṇa, according to the Śatapatha Brāhmaṇa, is the knowledge of the restoration of the head of the sacrifice (ŚB.14.1.1.18; 4.1.5.18). It is the secret of the restitution of wholeness which had become fragmented. The cause of the fragmentation, the cause of the lost head, was the overweening pride of the god himself who thus "lost his head." While Soma is creativity itself—in a state untainted by egoity—the secret of regaining the lost head belongs to a state in the godhead fallen from primal in-

nocence, when guilt had come to be. This latter mystery—enacted in the Pravargya ritual—slides into the place of the divine Soma transport. The horse's head divulged secrets of the gods. They were not the same, one supplanted the other.

Makha's head was cut off by a divine act of retribution—the termites hence were divinized. His sacrificial death is an immolation. Makha is the sacrifice by expiation. The slaying of Soma however fulfills his inner destiny. In order to be consumed Soma must be killed. The Soma sacrifice is a passion whereas Makha was felled by his overweening selfishness. The demon in Makha was liberated, the dark face of the cosmic giant was severed from the trunk, the cutoff head was purified in the Pravargya sacrifice. In its flames the head of Makha was made to glow with the radiance of the sun.

The secret knowledge by which the Aśvins, the celestial Healers, restored the sacrifice is contained in the Mantras of the Hymn to the Light (RV.10.170.1-3). It is these incantations which are meant by the Divākīrtiyas of which the Śatapatha Brahmana speaks (ŚB.4.1.5.15; SV.2.803-805; Ūhyanā.2.2.9). By the power of these words addressed by the Aśvins to the Light radiating from the Sun the head of Makha is restored to the body of the sacrifice.

Significantly, the hymn RV.10.171.2 immediately following this laud of the celestial Light, the Sun's radiance, praises Indra who severed the head of raging Makha from his body.¹² The beheading of Makha underlies the rite of the Pravargya. It is also one of Indra's heroic deeds. The slaying of demoniac darkness and thereby turning into Light is celebrated in more than one version. Makha, in the Ṛg Veda is raging darkness from whose body Indra severs the head so that it may arise as sun.¹³

¹² See note 1; RV.10.171.2. Makha as raging darkness thus figures as the primeval sacrificial "animal." The transformation of the demon into the sacrificial victim leads one step further. As sacrificial victim Makha supplants King Soma.

At a time when the Soma sacrifice was waning and Soma not readily obtainable, the Pravargya was added on to, supplemented, expanded, and reoriented the ancient rites.

When Indra had severed the raging head of Makha "he came to the house of one who had prepared Soma" (somin; RV.10.171.2).

¹³ Indra liberating the Sun is the subject not only of the Vala myth, but figures also in other images like that of

⁸ RV.9.65.22,23; Sāy. on 1.84.14; cf. 10.35.2.

⁹ RV.1.84.13-14.

¹⁰ Cf. A. A. Macdonell, *Vedic Mythology*, Strassburg 1897, 142. Wasson, 40.

¹¹ Brhad Devatā, 3.18-24.

No doubt the "demon" Makha is cognate, *ab intra*, with Makha, the sacrifice. The horse's head of Dadhyañc the fire priest, which the Ásvins—whose name derives from *asva*, "horse,"—had put on his shoulders, reveals the secret. The horse's head is the sun, itself. It is at the same time the head of the sun-horse. Through the mouth of Dadhyañc, the sun-horse's secret knowledge, the Madhu Vidyā is revealed, or, it is said, the sun horse "sings together with the Soma-inspired singers in heaven."¹⁴

In the Pravargya ritual, the head of Makha, the severed head, the Sun, represented as the "all encompassing hero," the Mahāvīra pot, is hallowed by the horse even before the pot is made. A stallion leads those who go to collect the clay from a hole, significantly situated towards the sunrise, to the east of the Āhavanīya altar where the gods are invoked, the priest addressing the clay, "Thou art the head of Makha,"¹⁵ and the stallion is made to sniff at the clay.¹⁶ When the Mahāvīra vessel has been shaped, it is fumigated with horse-dung burnt on the Gārhapatya altar.¹⁷ And the Mahāvīra vessel glowing on the crackling fire is lauded: "Loudly the tawny stallion neighed."¹⁸ Dadhy-

raging Makha (RV.10.171.2), or also that of Indra striking down the chariot of Uṣas, the Dawn (RV.10.73.6) in her darkness-aspect cf. A. K. Coomaraswamy, "The Darker Side of Dawn," *Smithsonian Miscellaneous Collections*, 64.1. Washington, 1935, 6. cf. RV.9.73.5, the dark skin which Indra hates and which is magically blown away from heaven and earth.

Taitt.S.1.1.8 invokes the head of Makha as the wide extended vessel which contains all life. This vessel however is made of potsherds (*kapāla*). The skin which is to be grasped by a god (not named), the victory over the demon appear in the same context, and Savitṛ, the Impeller or solar power is invoked to make ready (the vessel) in the highest firmament. The Pravargya ritual is adumbrated in the Yajur Veda.

¹⁴ RV.1.6.8, cf. A. Bergaigne, *La Religion Vedique*, II.380, fn. 2, or, the Sun is the hidden horse, RV.1.117.4-5, in its journey through the night.

¹⁵ Āpastamba Śrauta Sūtra 15.1.7; Taittirīya Saṃhitā 1.1.8.

¹⁶ Āp.ŚS.15.2.2.

¹⁷ Āp.ŚS.15.3.17; Vājasaneyi Saṃhitā 37.9, cf. K. Rönö, "Zur Erklärung des Pravargya," *Le Monde Oriental*, Uppsala, 1929, XXIII, 125.

¹⁸ Vāj.S.38.22, The platters for the Rauhiṇa cakes which are baked at the Pravargya are "horse-shaped." They were made of the same clay-mixture as the Mahāvīra. This makes van Buitenen, p. 15, notes 49 and 50,

añc, through a horse's head that the Ásvins—having beheaded him in order to save his human head—had given him, reveals to these horse-involved saviours, the cutoff head, the Mahāvīra, the "all encompassing hero," the Sun. And thus its symbol is the earthen Mahāvīra pot.

THE ELIXIR OF LIFE: SOMA AND PŪTIKA

When Viṣṇu or Makha or the sacrifice—they are synonyms—had his head cut off, sap flowed away and entered the sky and the earth. "Clay is this earth and water is the sky. Hence it is of clay and water that the Mahāvīra vessel is made."¹⁹ The elements earth and water carry the sap of Makha's head into the substance of the Mahāvīra pot. It will dry in the sun and be baked in fire. Earth or clay as it is dug from a pit east of the sacrificial hut is the major but not the only solid substance that goes into the making of the Mahāvīra pot. Four other ingredients are added to the clay. Their importance is primarily symbolical, the relevant ingredient is a certain plant. ŚB.14.1.2.12 speaks of this plant:²⁰ "Ādāra plants are Indra's might²¹ for when Indra encompassed (Viṣṇu) with might, the vital sap of Viṣṇu flowed away. And he lay there stinking as it were after bursting open (*ā-dar*). The vital sap sang praises. The Ādāra plants originated and because he lay there stinking (*pūy*) therefore [they are also called], *pūtika*. When laid on the fire as an offering they are fragrant for they originated from the vital sap of the sacrifice." The vital sap that flowed from the head penetrated heaven and earth and mid-air, all that lies under the sun. The vital sap that flowed from the beheaded body was pressed out from it by Indra's might. Indra's might is sustained by Soma. In the transport caused by that drink of immortality the inspired poets sing about Indra's deeds. Does the Ādāra plant here stand for Soma inasmuch as it is here called Indra's might? The Ādāra plant is not otherwise identified except that it originated then and there and that it is also called Pūtika. If the etymology of *ādāra* is her-

think, with some reserve, of the little baked clay horses attendant on icons.

¹⁹ ŚB.14.1.2.9; 14.2.2.53.

²⁰ Cf. Taitt.Ār.5.1.3.5; Āp.ŚS.15.2.1; Mānava ŚS.4.1.11, ed. J. M. van Gelder, New Delhi, 1961.

²¹ Vāj.S.37.6; inspired and invigorated having drunk Soma, Indra performs his deeds.

meneutic, that of *pūtika* is correct, not only philologically²² but also factually as will be shown.

In Indra's close embrace of Viṣṇu's body—limb by limb, he covered him—was Indra's power carried by osmosis into the fallen body of Viṣṇu-Makha? Was it too much for that beheaded and disintegrating body and did it burst open and plants spring forth?²³ These plants called either “Ādāra” or “Pūtika” are the most significant amongst the five ingredients that make up the clay of the Mahāvīra pot. They represent the might (*ojas*) of Indra communicated to the body of Makha and transmuted into plants which will be ground and mixed with the clay out of which Makha's head, the Mahāvīra pot, will be formed.²⁴

The other ingredients of the Mahāvīra pot are: earth from a termite hill²⁵ for these termites had been divinized and made “first born of the world”

²² Mayrhofer, *s.v.*

²³ ŚB.4.5.10.4 speaks about the provenance of Ādāra or Pūtika. This passage does not treat of the Pravargya myth, but of substitutes for Soma. The Ādāra plant in this context is one of the Soma substitutes, when Soma cannot be had. It is said to have sprung from the sap which spurted from the head of the sacrifice when the head was cut off. The implications of the myth are lost or overlooked when a part of it only is taken out of context. ŚB.14.1.2.19 narrates somewhat vaguely “when the sacrifice had its head cut off, its vital sap flowed away and therefrom those plants grew up.”

²⁴ According to Mānava Śrauta Sūtra, 4.1.9-10, the Pūtika plants were ground. Another version of the origin of the Pūtika plant, though lacking the coherence of the Brāhmaṇa of a Hundred Paths tells that the Pūtika plant grew from a feather or leaf (*parṇa*) when Soma was carried through the air by the falcon (Tāṇḍ.B.9.5.1). This plant which properly is called Śyenābhṛta, “carried hither by the falcon,” is Soma (RV.1.80.2; 8.95.3; 9.87.6). ŚB.4.5.10.2-6 however, enumerating the substitutes for Soma speaks of Śyenābhṛta and Ādāra as two different substitutes of Soma. Taitt.Ār.5.1.3.5 presents yet another name and story: “Makha leaning on his bow smiled overbearingly and his warmth of life (*tejas*) left him. The gods wiped it on the plants. The plant Syāmaka originated therefrom. Also his manly power (*vīrya*) flowed out.” Makha here is not decapitated, Indra is absent from the story. The Śyāmaka plant which may be a kind of grain or corn, does not otherwise figure in the story of Makha nor amongst the substitutes for Soma. Makha pays with his life for his hubris, his vitality goes to the plants.

²⁵ ŚB.14.1.2.10; Vāj.S.37.4; Taitt.Ār.4.2.3; Āp.ŚS.15.2.1.

in return for the part they played in the severance of Viṣṇu's head; earth turned up by a boar, for it was the boar Emuṣa-Prajāpati that raised the earth herself—she was quite small then—into existence.²⁶ These two additional kinds of earth establish mythically the consistency and existence of the substance of the Mahāvīra vessel from the beginning of things. The Pūtika plants are the third additional ingredient.²⁷ The sources do not reveal their identity. But the secrecy that surrounds them is not the only thing they share with Soma. The wrong identifications of the Pūtika plant are proportionate to those of the Soma plant, which is fair as the former is only a substitute for Soma.²⁸ Yet its relevance is such that it confirms the drink of immortality to have been pressed from a mushroom. This mushroom has been identified as the fly agaric, i.e. *Amanita muscaria*.²⁹

The fourth ingredient added to the clay, making altogether five components of the Mahāvīra pot,

²⁶ Cf. 25. These two earth admixtures are not always enumerated in the same sequence. Their proportionate amount is not indicated and seems to have not been relevant to the texture of the clay of which the pot was made. Like the ground Pūtika plants these ingredients had more ritual-symbolical than technical importance similar to the presence of gold and silver in the metal alloy called aṣṭadhātu (eight substances) of later day Indian bronze images.

²⁷ Vāj.S.37.6; ŚB.14.1.2.12; Āp.ŚS.15.2.2; van Buitenen, p. 57 quotes from Baudhāyana ŚS., a variant of Pūtika, namely Bādāra [Ādāra?] stalks. For references here given to Āp.ŚS. cf. van Buitenen, *passim*.

²⁸ Sāyana on Tāṇḍ.B.9.5.1 considers the Pūtika plant to be a creeper; Pūtika is explained as the flowers of the Rohiṣa plant by the commentary on Kātyāyana ŚS. An impressive array of wrong identifications of the Soma plant is given by W. Doniger O'Flaherty in Wasson, 93-130. According to ŚB.4.5.10.2, one of the Soma substitutes, the Phālguna plants, deserve mention. Of their two varieties, one with bright red flowers, the other with reddish brown flowers only the second was considered eligible. In this connection the observation in the Atharvapravācittāni, J. von Negelein, JAOS 34, 254-256, is of interest. Red Soma is said to grow in the Himalayas and brown Soma on Mūjavant. If the fly agaric, the mushroom identified by Wasson, has a red as well as a brown variety it would appear that in post-Vedic time the latter was in demand. Pūtika is cited among the substitutes by W. Doniger O'Flaherty.

²⁹ Wasson, *passim*.

is goat's milk (ŚB.14.1.2.13) or hairs from a she goat or black antelope (Āp.ŚS.15.2.1), for the goat and antelope are sacrificial animals, "born of fire," symbols of heat.

King Soma was killed in that he in the shape of the Soma plant was pressed.³⁰ "In the slaying of Soma the sacrifice is slain, with the sacrifice the sacrificer."³¹ In the Soma sacrifice the sacrificial significance of Soma was enhanced by his royal status. In the course of the Pravargya sacrifice, King Soma having been enthroned, that is a bundle of Soma plants having been placed on the seat of a high four-legged stool, the *rājāsandī*, which reaches to the navel of the sacrificer, a similar throne that may be higher, even shoulder-high, is placed near King Soma's throne. This is the Emperor's throne (*saṃrādāsandī*) on which the Emperor, the "All-encompassing Hero," the Mahāvīra vessel will rest.³²

The Emperor, the All-encompassing Hero, Mahāvīra, the Sun, is the Great God of the Pravargya. His throne faces east, for nothing must come between Mahāvīra and the sun.³³ Symbolically they are one, Makha's head is the Sun.³⁴ This is the meaning of the Mahāvīra vessel. It has no other "content." Its fiery glowing shape encompasses its cavity, its vastness. Only after the pot has achieved its greatest heat and splendour is hot milk poured into it, the offering to the Aśvins.³⁵

³⁰ Taitt.S.6.4.4.4; 6.6.7.1.

³¹ Taitt.S.6.6.9.2.

³² ŚB.14.1.3.10; 3.3.4.21; cf. van Buitenen, p. 15; the three Mahāvīra pots, two of them in reserve,—should the empty, red hot glowing pot crack during the sacrifice,—are placed on the *Samrādāsandī*, the emperor's throne.

³³ The emperor's throne is placed south of the Āhavanīya fire where the gods are invoked and receive their offering and north of King Soma's throne, ŚB.14.11.3.8, 12. Notwithstanding these rites, raising Mahāvīra above Soma, the Śatapatha Brāhmaṇa, ritually, though not logically, sums up its entire section on the Pravargya with the words "The Pravargya indeed is Soma" (ŚB.14.3.2.30). In this identification the Pūtika plant plays the main role.

³⁴ Vāj.S.38.24; ŚB.14.1.3.3-6.

³⁵ Āp.ŚS.5.9.10-12; 15.10.1-5. In the course of the sacrifice curds are offered to Indra and other gods. The curds offered to Soma should be curdled with Pūtika plants (TS.2.5.3.5) in the first place, or with bark while other curdling agents such as rennet, curds, rice, or buckthorn should be used for the offering of the curds

The All-encompassing Hero, the Sun, of the Pravargya, being joined to the Soma sacrifice, is the head of the sacrifice. "The head of the sacrifice has become joined in the same manner in which the Aśvins restored it." (ŚB.14.2.2.43) Just as the Aśvins knew how to put the horse's head on the shoulders of Dadhyañc whose human head they had to cut off and then restored to Dadhyañc his human head, so they restored the head of the sacrifice. It was the horse's head that taught them this secret.

This is how the Śatapatha Brāhmaṇa presents the Madhu Vidyā, the sweet, secret knowledge that Dadhyañc's horse's head betrayed to them. In the Ṛg Veda however, it was another secret that Dadhyañc betrayed to the Aśvins. This secret was "Madhu," the innermost "sweetness," Soma. (RV. 1.116.12; 1.117.22)

More than half a millennium lies between the two meanings of the Madhu Vidyā in the Ṛg Veda and the Brāhmaṇas. The Sun cult of Mahāvīra, the All-encompassing Hero, was combined with the Soma sacrifice. The meaning of this combined sacrifice revalued the ancient secret of the horse's head, of Dadhyañc and of the Sun.

The substitution of contents and the continuation of the original Soma sacrifices has a ritual analogy in the relation of the Soma plant, identified by Wasson as the fly agaric, *Amanita muscaria*, and its substitute, Pūtika. King Soma has not been dethroned, but his throne is further from the sun than that of Emperor Mahāvīra. Into the making of Mahāvīra went the Pūtika plant. This symbolically essential ingredient of the Mahāvīra pot has an unsavory connotation accounted for by the myth, told in the Brāhmaṇa of a Hundred Paths. However, its offensiveness is turned into fragrance when the plant is laid on the fire. This transfiguration in and by the ritual is similar to that of the juice of the Soma plant itself, which is made palatable ritually by an admixture of milk.

Mythically, however, the purification of Soma is effected by Vāyu, the Wind. He blew with the gale of the spirit when Indra freed the cosmos from the Asura, the non-god, the Titan, Vṛtra the Serpent. Soma was in Vṛtra (RV.10.124.4) and Indra slew Vṛtra, the ophidian Asura. Slain Vṛtra stank to heaven, sour and putrid. Vāyu blew away that foul smell—"the smell of King

to other gods.—In more than one ritual context is Pūtika linked with Soma.

Soma." He was neither fit for offering, nor was he fit for drinking (ŚB.4.1.3.5-8).

Agni, Soma and Varuṇa were in Vṛtra, the Asura. They were ensconced in the ambience of this ancient cosmic power. Indra slew this dragon, his antagonist. Agni, Soma and Varuṇa were liberated. They went over to the young conquerer god. The rule of the world had changed. But inasmuch as Soma was in Vṛtra he was slain with him who had contained him. However, he came out of the decomposing carcass. Its odor clung to him. Vāyu blew on him and made him palatable (ŚB.4.1.2.10).

The preoccupation of this account with the stench of the decomposition of the flesh of the World Serpent and of King Soma smells of guilt, the guilt of murder. The odor associated with the putrid smell of dead bodies was not unfamiliar it seems to the priests after animal sacrifices. The gods themselves dispelled some of the smell of King Soma and laid it into [dead] cattle. (ŚB.4.1.3.8) In fact, the priests had chosen the plant Pūtika and endowed it with a myth of its own (ŚB.14.1.2.12) in the context of the sacrifice. In this myth stench as a symbol of evil is implicated in and purified by the sacrifice. The plant Pūtika, however, when laid on the fire as an offering is said to become fragrant, it acquires the odour of sanctity.

PUTKA AND THE SANTAL OF EASTERN BIHAR

In Eastern Bihar there live aboriginal people, the Santal, occupying a stretch of country called the Santal Parganas, and we find scattered villages of Santal also in the adjacent regions of Orissa and the western marshes of West Bengal. The Santal number some millions. Until recently they were a hunting and food-foraging folk. Their language is not derived from Sanskrit nor is it Dravidian: it leads the third, smaller group, the Munda family. A trait of these languages is that their nouns are not classified into genders—masculine, feminine, neuter—but are either animate or inanimate, either possessing a soul or not possessing a soul. The whole vegetable kingdom is inanimate, soulless except for one word that designates a certain mushroom. That noun is *putka*: it is animate, a soul possesses it.

P. O. Bodding in the preface to his *Santal Dictionary* (Oslo, 1929-1936, 1, xiv) draws attention to a noteworthy fact: "Strangely enough, the Santals use some pure Sanskrit words, which, so far as I know, are not heard in present day

Hindi." He might have added that, at least in the instance we are considering, the word has disappeared from all Sanskrit vernaculars. We may owe this survival to the mycophilia of the Santal, whose knowledge of the fungal world is reflected in a substantial fungal vocabulary. By contrast the Hindus are mycophobes: the twice-born castes are expressly forbidden to eat mushrooms, whether growing on trees or from the earth (Manu 5.5.19; 6.11.156; Āp.ŚS.1.5.14.28).

Among the Santal the *putka* is a mushroom and, alone in the whole vegetable kingdom, possesses a soul.³⁶ Did not *putka* inherit this sacred character from long ago when it was an ingredient of the Mahāvīra pot, which was ritually "animated," endowed with sense organs, with a soul? Is not *putka* the Sanskrit *Pūtika*?

The second peculiarity of *putka* is its revolting smell when gathered and left for a day or two exposed to the air.³⁷ In Dumka (Santal Parganas) a Santal woman in answer to questions put to her by Wasson said that she thought she might know why *putka* was animate; the Santal consume *putka* in their curry, but at the end of a day or two should any *putka* have been left over, the remains of the leftover *putka* stink with the stench of a cadaver.³⁸ She did not know the meaning of the

³⁶ Roger Heim and R. Gordon Wasson: "Les Putka des Santals, champignons doués d'une âme." *Cahiers du Pacifique* 14, 1970, pp. 59-85. *Putka* appears to be a Santalized version of Sanskrit *Pūtika*, the name in Sanskrit having a long or short "i". In the light of this discovery in Santal, one would like to inquire whether the same word with the same attributes is current in the sister language Ho, and in other languages of the northern group of Munda languages and, if so, whether it is present in the southern group.

³⁷ Heim and Wasson, p. 65. The only other reason supplied by many Santal to justify the unique status of *putka* was that it was commonly found in the sacred village grove of *sarjom* trees (i.e. *śāl* in Hindi; *Shorea robusta*). But the *sarjom* itself is not animate; why therefore the *putka* around it, especially as the *putka* is not confined to *Shorea robusta*?

³⁸ Ibid. p. 85. The Santal distinguish three kinds of *putka*. (1) *hor putka* in which *hor* means 'man' or 'human being' or any Santal; (2) *seta putka*, *seta* meaning 'dog'; and (3) *role putka*, *role* being a "toad" or "frog." It emerges from the Heim-Wasson paper that these authors consider the first as variations in usage and the terms are applied interchangeably, the usage varying in different villages and possibly with different stages of

word *putka* nor the myth of Pūtika in the Brāhmaṇas. Wasson himself did not link *putka* with Pūtika though he supplied the evidence for the identity of this mushroom.

The third peculiarity of *putka* in Santal culture is the Santal belief that the *putka* are generated, not from seed, as are the generality of the vegetable world, but by the thunderbolt; in short, generated by divine intervention. Soma itself is generated by Parjanya (RV.9.82.3) apparently when his thunderbolt strikes the earth (cf. RV.5.83.1,2,7).

Pūtika, the foremost, and possibly the only direct surrogate for Soma, is a mushroom. When the fly agaric no longer was available, another mushroom became its substitute. It had acquired a myth of its own. Nothing is known about any psychotropic virtue Pūtika may have. However, no drink was made from it. Instead it was crushed, mixed with the clay of the pot. Its transsubstantiation into the "All-encompassing Hero" came about through fire, for it is said that the plants themselves strewn on fire become fragrant "because they originated from the sap of the offering;³⁹ moreover, integrated into the substance of the fire-baked vessel, anointed with butter, they glow in glory in the fire of the Pravargya.

None of the other alleged substitutes for Soma has a myth of its own. Pūtika sprung from the slain body of the sacrifice is a resurrection, as it were, of Soma. The other plants have no myth of

growth. The third is a puffball that appears suddenly after thunder storms. Many Santal have never heard of the *rote putka* and of those who had, few were able to identify it. The puffball does come in response to thunder, but the belief in thunder as the generative agent applies equally to the *hor putka* and *seta putka*. The *hor* and *seta putka* is an hypogean species, harvested when it finally breaks the surface of the ground. It has often been called a truffle, or 'truffle-like', which it is not. The *Frog* or *rote putka* calls to mind the Hymn to the Frogs (RV.7.10.3.8). There reference is made to the Gharma, the offering of hot milk and to the officiating priests, the Adhvaryus. In the ŚB. the Aśvins who had not been invited to the sacrifice became the Adhvaryu priests of the sacrifice after they had restored the head of the Sacrifice by the mantras of the Hymn to the Sun (RV.10.170.1-3).

In the paper by Heim and Wasson, Professor Heim describes the *putka* mycologically and gives them their scientific names.

³⁹ ŚB.14.1.2.12,

their own except the Śyenābhṛta plant which, as the name tells, is Soma itself. The name Śyenābhṛta meaning "carried by the falcon" conveys the myth of Soma having been brought from heaven by a falcon (RV.8.82.9; 10.144.5) when a feather or leaf, fell to earth⁴⁰ and the plant sprang from it. Regarding the other substitutes of Soma nothing but a similarity of colours connects certain flowers; or the fact that they were used in the sacrifice, certain varieties of grass, viz. Kuśa and Dūrvā grass.⁴¹ A mushroom is foremost among the substitutes of Soma. Moreover, a mushroom is a significant ingredient in the sun-cult of Makha's head, added to the Soma sacrifice. Pūtika though secondary in its role, being a surrogate for Soma, occupied a position of eminence in its own capacity as an essential ingredient of the substance of the Mahāvīra pot. Pūtika was raised into the region of the sacred as a surrogate for Soma, the most exalted plant in Vedic rites which indeed had Soma for their center. Pūtika, however, did not succeed Soma, did not become hallowed by the same rites but was integrated into the substance of the Mahāvīra vessel. Soma was meant to be drunk. The Mahāvīra vessel was meant primarily to be made and seen. Its communion with the sacrifice was by a craft and ultimately by sight only.

The identification of Pūtika, the Soma surrogate, supplies strong evidence that Soma indeed was a mushroom. Pūtika integrated into the Mahāvīra pot played its part in the mystery of the Pravargya sacrifice. That Putka-mushrooms should be known, to this day, as "endowed with a soul" witnesses amongst the Santal of Eastern India a memory of the numinous emanating from the indigenous Indian Soma substitute.

Mixed with the clay and the other ingredients Pūtika is part of the substance of which the Mahāvīra vessel is made; it is dried in the heat of the sun, baked in the fire, placed on a silver dish and anointed with butter. The vessel is heated at the peak of the Pravargya to a red-hot glow, when the golden plate that had covered the mouth of the Mahāvīra pot is removed. The "All-encompassing Hero," the "Head of Makha," the vessel

⁴⁰ Tāṇḍya B.9.5.1 assigns to Pūtika the myth of Śyenābhṛta, saying that Pūtika is the plant which grew from a feather (or leaf, *parṇa*) that fell to earth when Soma was carried through the air in contrast to the far more telling myth of ŚB.14.1.2.12 about the origin of Pūtika.

⁴¹ ŚB.4.5.10; 14.1.2.12.

that contains all life,⁴² that is flame, glow, and heat, is the Sun.⁴³ Mahāvīra, is "Lord of all the worlds, Lord of all mind, Lord of all speech, Lord of all tapas [the fiery strength of asceticism], Lord of all brahman [the power of the sacred word], Lord of creatures, Spirit of poets."⁴⁴

THE MAHĀVĪRA VESSEL

The Mahāvīra vessel is prepared at the sacrifice itself. The making of the earthen vessel is itself part of the ritual.⁴⁵ The pot is shaped by hand; it is not thrown on a potter's wheel. Its height will be a span⁴⁶ and it is Makha's Head. Its shape however does not resemble any head or face, though part of it is called its mouth, but is also spoken of as opening⁴⁷ or outlet or as an outlet for pouring into.⁴⁸ The shape of the vessel resembles the Vāyavya, the wooden vessel which held the libation for Vāyu, the Wind.⁴⁹ The mouth or opening or top of the pot is also metaphorically called a nose for the Mahāvīra pot. It is contracted in the middle and projects outward, widening toward the top.⁵⁰ These metaphors do not aim at conjuring up a physiognomy. They refer to a human face as much or as little as does the measure of a span.

The wooden Vāyavya vessel is named after Vāyu, the Wind. The gods rewarded Vāyu with the first libation of Soma from this vessel because he was the first to tell them that Vṛtra had been slain (ŚB.4.1.3.4). Subsequently when Vāyu had made Vṛtra-Soma fit for offering and fit for drinking the libation vessels belonging to other gods were also called Vāyavya or Vāyu's vessels (ŚB.4.1.3.10). Vāyu, the Wind, had made Soma sweet. "Therefore what becomes putrid they hang out in a windy place" (TS.6.4.7.1).

⁴² Cf. TS.1.1.8.

⁴³ ŚB.14.1.3.17,26.

⁴⁴ Āp.ŚS.15.8.15-16; tr. van Buitenen, 92; matter in brackets added.

⁴⁵ ŚB.14.1.2.2.

⁴⁶ ŚB.14.1.2.17.

⁴⁷ Aśv.Gr.S.4.3; *bila*, commented as *garta*, "a hollow."

⁴⁸ Kāty.ŚS.26.1.16; *āsecana*.

⁴⁹ Āp.ŚS.12.1.4; a libation vessel for an offering to Vāyu; Renou, s.v. the same as Ūrdhva-patra, a high vessel in the shape of a mortar. Cf. Kāty.8.7.5.

⁵⁰ ŚB.14.1.2.17. The references to facial features do not conjure up the image of a face. They enliven single features of the pot.

The Mahāvīra vessel conforms with the libation vessels called Vāyavya. While these are carved out of wood the Mahāvīra pot is built up of clay.

The lump of clay for the pot is divided into three parts, one part to be the bottom. The clay, pressed down with the thumbs and flattened, is addressed with the words "you are the two feet of the sacrifice."⁵¹ Obviously no similarity to any feet is intended here. The lowest part of the pot supports the vessel as the two feet support the human figure.

The second part of the clay is used for building the walls of the vessel up to the height of its collar (*parigrivā*). The clay is laid on in three, five or an indefinite number of *uddhis* (elevations), that is, in coils or rings.⁵² They seem to decrease in diameter towards the middle of the height of the vessel and increase towards its top. The contracted middle is referred to as *lagnam*. This is not to be understood to be a joint but denotes an intersection of planes.⁵³

The third portion of the original lump of clay goes into the making of the top portion of the vessel which flares out to a height of two or four thumb widths above the collar (*parigrivā*) or girdle (*mekhalā*)⁵⁴ laid on in high relief around the pot.⁵⁵ At the conclusion of the rites of Makha's Head, milk will be poured into the pot.⁵⁶

Once the vessel is completed it must not be touched by hand.⁵⁷ It is held, raised, and transferred by tongs. The high relief of the collar or

⁵¹ Āp.ŚS.15.2.14; Taitt.Ār.4.2.6. cf. R. Garbe. "Die Pravargya Ceremonie nach dem Āp.ŚS." *ZDMG* 34, 1880, 319.

⁵² Āp.ŚS.12.1.4.

⁵³ Baudhāyana (van Buitenen, 10) gives a clear description, cf. also Āpastamba (ibid p. 9). The number of *uddhis* or "rings," i.e. superimposed parts varies from tree to four or more.

⁵⁴ Taitt.Ār.5.3.5 *parigrivā*, also *rasnā* or "girdle" (Āp.ŚS.15.2.17) are here synonymous.

⁵⁵ Garbe, p. 329.

⁵⁶ Van Buitenen, 10f; based on Baudh.ŚS. [see also drawing on p. 11]. Van Buitenen understands the three portions of the lump of clay to have been shaped as two small balls one on top of the other, and supported on a broad calotte shaped base, suggesting the shape of a man seated cross legged. This reconstruction is not according to the texts nor would it serve the purpose of the Mahāvīra pot.

⁵⁷ Van Buitenen, 15; Āp.ŚS.15.4.6-8,

girdle would have prevented a slipping of the tongs.

The shape of the Mahāvīra pot is not anthropomorphic: it has neither the shape of a head, face, or figure of man. It is not an icon but a symbol in the shape of a vessel. To the officiating priest and to the sacrificer it means the Head of Makha, the Sun, and its mystery is experienced by them in the ritual. While they enact it, this mystery pervades their entire being, Mahāvīra comes to life in them and they live in him. "Like the two eyes, like the two ears, like the two nostrils thus he [the priest] places the senses in him."⁵⁸ The Pravargya is a mystery rite, it requires a special initiation over and above the one for the Soma sacrifice.

The Pravargya is a complex ritual. Its first part, the Pravargya proper, is a sun ritual. Its main symbol is the red hot, glowing Mahāvīra, "the All-encompassing Hero," who encompasses as sun the horizons of heaven,⁵⁹ unbounded space, all the world.

The second main part of the sacrifice begins when the vessel, having been made to blaze and having been hymned, is filled with milk. This part of the sacrifice belongs to the Aśvins: it is the offering of hot milk due to them, the Gharma proper.⁶⁰ In this capacity, the Aitareya Brāhmaṇa lauds the Gharma as divine intercourse. The vessel is the member, milk is the semen, ejaculated—while boiling—into the fire as the divine womb, the birthplace of the gods, as generation.⁶¹ Extending beyond the sacrifice, into the cosmos, Mahāvīra, creator, procreator, by begetting extends from the bottom to the top, penetrates and supports heaven and earth.⁶²

The coincidence within the same visual symbol, the Mahāvīra vessel, of tropes taken from the shape of man is not to be seen as an overlapping

of physical features. Each evocation conjured up an inner experience, valid in itself and not an image. The function of the lowest part of the pot is being felt as akin to that of feet; the top of the vessel, its opening, functions as mouth for liquid to be poured in and out. Or the entire pot is felt to function as the cosmic, procreative member, aggrandized as cosmic pillar. In another context, however, the Mukhalinga symbol of Śiva is a visually materialized form of such coinciding tropes. In this visualized symbol, the liṅga however had no procreative meaning. On the contrary, the concept of the ascending, not ejaculated but transubstantiated, semen as the substance of illumination is the motivating belief or experience that conjoins the shapes of phallus and head. The Mahāvīra vessel is not anthropomorphic. It releases in the ritual the experience of the creative power of the Sun by the conception of "Makha's Head" and again by an upsurge of procreative empathy of which the vessel becomes the liṅga-like symbol.

The allusion to the figure of man however is implied throughout the sacrifice. In the Pravargya, at the conclusion of the entire sacrifice the implements of the sacrifice are assembled around the Mahāvīra pot either in the shape of man⁶³ or in that of the sun. This alternative implies the transfiguration of man, the sacrificer, which is the purpose of the sacrifice. The sacrificer has reached the sun, "the radiant face of the gods, the eye of Mitra, Varuṇa and Agni."⁶⁴ "With the sun's eye I gaze upon thee,"⁶⁵ the priest had addressed the Mahāvīra vessel when it had been baked in the fire and he had lifted the pot on the gravel kept ready for it. "Were not the eye sun-like, never could it perceive the sun," thus Goethe worded a knowledge expressed by the priest in the ritual sun-gaze of recognition of the completed Mahāvīra vessel. This cosmic realization comprises all beings. Mahāvīra, the sun, the All-encompassing Hero is addressed: "Mahāvīra, may all things regard me with the eye of a friend. May I regard all beings with the eye of a friend. With the eye of a friend do we regard one another."⁶⁶ "Long may I live to look on thee."⁶⁷ "Through a

⁵⁸ Ait.B.4.1.21.

⁵⁹ Āp.ŚS.15.6.2; 15.8.15-16.

⁶⁰ In the Rg Veda, the Gharma was offered to the Aśvins in a metal cauldron (RV.5.30.15) which has no original connection with the Mahāvīra clay pot. The Pravargya includes finally also an offering to Indra, of hot curds, the Dadhigharma. The Rg Vedic offering of hot milk to the Aśvins became combined with the ritual of the red hot Mahāvīra pot.

⁶¹ Ait.B.4.1.22.

⁶² Śāṅkh.ŚS.5.9.4; Aśv.G.S.4.6.1, cf. AV.4.1; 2.4; cf. van Buitenen, p. 67. This recitation accompanied the first part of the Pravargya.

⁶³ ŚB.14.3.2.2; 14.2.2.16-22 and Baudhāyana; cf. van Buitenen, p. 130, note 6.

⁶⁴ Āp.ŚS.15.16; RV.1.115.1.

⁶⁵ Āp.ŚS.15.4.6-8; Mānava ŚS.4.1.26.

⁶⁶ Vāj.S.36.18.

⁶⁷ Vāj.S.36.19.

hundred autumns may we see that bright eye, god appointed, rise."⁶⁸

THE LATER AND SEPARATE LIVES
OF MAHĀVĪRA AND PŪTIKA

Mahāvīra, the All-encompassing Hero, is also the name of the last Jina or Conqueror of the twenty four Jinas or Saviours (*tirthaṅkaro*) in the heterodox Jaina religion. His mythical life story is the exemplar for that of the other Tirthaṅkaras. Before his birth his mother had fourteen prognostic dreams. In one of them she beheld a vessel, a "brimming vase." This vessel of abundance is a symbol of ultimate knowledge.⁶⁹ In another frame of reference this vessel is also the Sun as vessel containing all time.⁷⁰ The brimming vase is common to the art of Buddhism and Hinduism. It is shown brimming with lotuses. They are particularly associated with the Lotus Goddess, Lakṣmī, Goddess of Plenty. The Mahāvīra vessel, however, held no tangible contents. This sacred vessel as the All-encompassing Hero, the Sun, rules over space and time. In its Jain context it also holds that one supreme knowledge which has overcome the separateness of space and time, the manifoldness of the world.

The iconology of the prognostic dream vessel seen by the mother-to-be of the Saviour and which prefigures his life on earth, however, differs from all the other sacred vessels represented in Indian art. It is known to us in the Western Indian school of painting after the fourteenth century. There it is shown flanked, at the height of its neck, by wide open, far-seeing eyes. They are painted next to the vessel, whatever be its shape, not on it. Together with it, they form an inseparable configuration showing with utmost clarity the vessel with the eyes that belong to it. Visually, this configuration combines, as a truly creative symbol, the presence of the sacred vessel and that of the all-seeing eyes which are its own. Floating on a monochrome coloured ground, they gaze, charged with the mystery of the sacred vessel, with the power of Mahāvīra.⁷¹

⁶⁸ Vāj.S.36.24; RV.7.66.18.

⁶⁹ *Kevala-nāṇa dāmsana*; A. K. Coomaraswamy, "The Conqueror's Life in Jaina Painting," *Journal of the Indian Society of Oriental Art* 3, 1935, p. 136f; pls.35,2;36.

⁷⁰ AV.19.53.3; cf. note 69.

⁷¹ In some of the paintings the vase and the flanking eyes are combined into a phantasmagoric "face" (Coomaraswamy, Pl. 35,2.) comprising further subservient

The Mahāvīra vessel and the Pūtika mushroom are significant elements in the fabric of Indian tradition. Pūtika starts with being a substitute for Soma, the drink of immortality, the elixir of life. Pūtika qualifies for this part because Pūtika is a mushroom reddish brown in colour. This mushroom amongst other reasons was chosen when the Soma plant, the fly-agaric, gradually became unavailable, in preference to other indigenous mushrooms for its being conspicuous or noticeable by the bad smell the cut mushroom develops. Hence also its name Pūtika. Once chosen in lieu of Soma, Pūtika usurped as its own the name "Śyenābhṛta" and the myth of Soma's origin from on high. The substitute became authenticated as the original.

A gap of more than two and a half millennia, a transfer from Aryan priestly symbolism to tribal belief, the tribe adopting a Sanskrit name with but little change into its own language, the survival of this name in a Munda language, in a region at a considerable distance to the east from the ancient center of Brahmanical sacrifices, all this did not impair the ongoing myth of Pūtika. This species is known to the Santal as "endowed with a soul." It is distinct from other mushrooms, from all the vegetable kingdom as being numinous. The odor of sanctity clings to this mushroom, however pejorative its telling name.

The sanctity of the Mahāvīra vessel as artifact and symbol, judging by the pristine technique of shaping the earthen pot, would belong to an age far beyond the age of the Brāhmaṇas. Deified, the Mahāvīra pot is the center of a ritual, entirely its own. The very making of it is part of the ritual. In this respect this pottery ritual may be grouped with the "brick piling" ritual of the Vedic altar,⁷² but also with the function of the potterpriest in South India today.⁷³ The Mahā-

devices. On the other hand, the conception of the Sun-eye, as eye "per se" more or less independent of the face of the figure is one of the main factors in the style of the Western Indian school of painting, cf. S. Kramrisch, "Western Indian Painting," under publication by Bhagawān Mahāvīr 2500th Nirvāṇ Mahotsava Samiti, Bombay, 1974.

⁷² The square *ukhā* made of clay which held the heads of the five sacrificial victims was part of the sacrificial pile. It was neither the central cult object nor even a cult object in its own right.

⁷³ S. Kramrisch, *Unknown India*, Philadelphia Museum of Art, 1968, 57.

vīra pot is not in any way like a head urn, nor does it resemble a human figure: it refers to the sun,—not by virtue of its shape but by the process of making it. The vessel is dried by the heat of the sun and baked in a fiery pit. In the culminating ritual its validity is established in glowing glory wreathed in flames as symbol of the Sun or the Head of Makha, the cosmic giant.⁷⁴

The worship and disposal—the whole ritual—of Mahāvīra, though part only of the total Pravargya sacrifice are organised with the finality of perfection. The incongruity of an empty earthen vessel as symbol for Makha's head, the Sun, seems inexplicable. Yet a symbol is what one makes it to mean. The mouth or nose of the pot are as suggestive as are the implements in the final laying out of all the paraphernalia of the Pravargya, where they are understood to reconstruct the shape of man. Three pots (the original and the two reserve pots should the original crack) form the "head," the unclipped broom that had been used in the ritual is placed above the head, so as to form a hair tuft, the tongs are the shoulders, and so on, the straws of the other broom are scattered over the configuration that embodies the essence of man, so as to form its muscles.⁷⁵ Whatever took part in the sacrifice, becomes part of the transfiguration of sacrificial man. The configuration of the paraphernalia of the sacrifice is vested with their composite magic. If the implements are arranged in a way so as to conjure up an image of the sun, the same purpose is fulfilled.

The head of sacrificial, transfigured man is represented by the three Mahāvīra pots, each of them is the head of the sacrifice—even though only one played its role. Though there are three they mean one and the same only. In the sacrifice Makha's Head is the sun, the pot is Makha's head, the pot is the sun. The pot is the head though it is unlike a head. The pot is made by the priest, the Adhvaryu, or he delegates this task to a potter (*kartr*, "the maker"). The pot is the sun, is Makha's head, the head of the sacrifice not by a likeness of its shape but by that of another quality which has its maximum effect at the culmination of the sacrificial heating of the vessel. It is then that Mahāvīra, anointed with butter and, heated to the highest degree, attains the fieriness of the sun. It had been covered with a golden dish so that it should protect heaven from its

heat.⁷⁶ The "All-encompassing Hero, glowing gold-colored, encompasses as sun, the horizons of heaven."⁷⁷

In South India of the present day, the cult of Aiyanar requires clay images of Aiyanar and his retinue. They are made by the village potter who is at the same time the officiating priest. He is a Kusavan by caste, son of a Brāhman father and a Śudra woman.⁷⁸ Did clay, being baked in the fire and turning from earth to glowing splendor, effect in a potter-priest an initiation through the potter's craft, familiar only with his sundried output? Did he behold the fiery sun glowing in his own work? Did the sun cult of the Mahāvīra pot arise amongst potters and make them priests of their calling? Was it a cult indigenously Indian where the heat of the sun is as powerful as its splendor so that transposed into a rite the glow of the earthen pot and the vehemence of the flames are intensified by the anointing of the vessel? It was made by hand, the clay pressed into shape by the thumbs without a potter's wheel. This pristine technique was hallowed. It had arisen from direct contact, preserved the shape and the manner in which the vessel had been fashioned when the sediments of more than one myth were integrated in its substance and when the Sun vessel once-finished was not to be touched by human hands. It was not to be touched by human hands for its heat would have burnt them. The vessel was not to be touched because it was sacred. It was not to be touched so that the only contact with the sacred object was by sight, sight intensified to the exclusion of all other sensory perceptions, a rite of "seeing" a communion by vision.

An indigenous sun cult celebrated by the ritual of its craft became the "Head of the sacrifice" and Makha's head was joined to its body. Symbols live their own lives, draw to themselves their affinities, coalesce with them and emerge showing in various facets an identity of ambience of meaning. Mahāvīra, in the Aitareya Brāhmaṇa, encompasses all creation, in the intensity of the climactic moment of procreation. The vessel now stands for the Liṅga. Head and procreative organ are coterminous yet do not overlap in the vision of the Brāhmaṇas.

⁷⁶ Āp.ŚS.15.8.5a; Lāty.ŚS.1.6.24; Śāṅkhāyana ŚS.5.9.13; van Buitenen, 77.

⁷⁷ Cf. Āp.ŚS.15.6.2.

⁷⁸ S. Kramrisch, 57, see also note 18.

⁷⁴ Cf. RV.10.171.2; and, above, p. 225.

⁷⁵ Āp.ŚS.15.15.1.

Through long stretches of Indian thought and imagery, the symbolism of Liṅga and head combined in the creation of a visual whole. The Mukhaliṅga of Śiva, the phallus with a head or heads, is a concretely realised sculptural form perduring for two thousand years of Indian art, though with a total reversal of the implied meaning which here extols antithetically the power of creative heat as fervor of ascetic sublimation not as a spending into the fiery lap of all gods-to-be but as a self-contained rarification and ascent of this power.

On another facet of its meaning, Makha's head, the Sun, the All-encompassing, All-seeing eye of the world, fastens its steady gaze on all and everyone. The brimming vase sends forth this glance in eyes that are painted outside its shape, bestowing the power of sight and insight. Two vessels overlap in this Jain rendering of ancient themes. The one is the Mahāvīra pot, which the "Unbounded," Aditi, is invoked to encompass.⁷⁹ It contains

ultimate knowledge and all time. These are intangible contents. The other vessel is the "full pot" (*pūrṇa ghaṭa*), the brimming vase of plenty, Lakṣmī herself.

The symbolism of the Mahāvīra vessel is deeply ensconced and has manifold connections in Indian thought and art. Pūtika, on the other hand, only contributes to the substance of the vessel. The mantle of King Soma had fallen on this notable mushroom, which inherits the glory of Soma for whom it is a surrogate. Its heyday is in the Prāvargya ritual. Then the mushroom is lost to us in a millennial darkness from which, miraculously, it emerges "endowed with a soul" amongst the aboriginal Santal of Eastern India in our own day.

comprise its cavity, ŚB.14.2.7; Mānava ŚS.4.3.1 invokes the cow as Iḍā, Aditi and Sarasvatī. While on one level the cow whose milk will fill the pot is Aditi, on the highest level Aditi remains Boundlessness itself.

⁷⁹ Taitt.Ār.4.2.6; Aditi, "the Boundless," is invoked to



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COVER ARTICLE

BOTANICAL DETERMINATION OF THE MIDDLE EASTERN TREE OF LIFE

J. ANDREW McDONALD

Now that man has become like one of us in knowing good from evil, he must not be allowed to reach out his hand and pick from the tree of life too, and eat and live forever! . . . (so god) banished the man, and in front of the garden of Eden he posted the great winged creatures and the fiery flashing sword, to guard the way to the tree of life.

(Genesis 2:21–24)

Early myths and religious beliefs that account for the origin of life and human aspirations to attain immortality are often ignored or scorned by natural historians, as they tend to contradict modern Darwinian views of natural creation and current biological understandings of the aging process. Allusions to an immortalizing ‘tree of life’ in the mythic traditions of Mesopotamia, the Levant, and India are therefore thought to arise from the hopeful and imaginative yearnings of superstitious peoples rather than historical realities. Linguists and comparative mythologists have long recognized, nevertheless, that references to such a plant appear recurrently in mythic, artistic, and historical records of Indo-European, Semitic and Hamitic peoples (Carnell 1991:9–17; Cook 1974; James 1966:129–162; Pärpola 1993). This observation convinces some commentators that ancient beliefs in an immortalizing ‘plant of the gods’ may have a material or logical basis in human history. Some historians have hypothesized that the concept of a tree of immortal life derives from the widespread practice of ingesting psychotropic plants to heighten or distort human perceptions of reality (Ruck 1986; Ruck, Staples, and Heinrich 2001; Schultes 1992; Smith 2000; Wasson 1986). Whether this is the case or not, no single plant has ever been identified that could have served the same purpose for so many different peoples throughout Europe and Asia.

SACRED TREES IN THE VISUAL ARTS

Visual renderings of a symbolic ‘tree of life’ in the arts of the Near and Middle East from the 3rd–1st millennium BCE portray a plant whose physical attributes are generally consistent with

mythical traditions of the region. They depict a pillared plant that grows from an aquatic medium or world-mountain toward the image of a sun (Fig. 1a, c–e; Danthine 1937, Fig. 139, 176, 254, 691–696). This plant is often illustrated in a narrative context, usually in association with a host of divine human figures, snakes, eagles, lions, bulls, or leogryphs. Early depictions of the motif on cylinder seals from the 3rd millennium BCE are usually too poorly preserved or stylized in their execution to allow for a botanical interpretation (Frankfort 1939, Pls. 4j, 13e, h; Pärpola 1993), but later interpretations of the plant during the late 2nd millennium BCE are increasingly amenable to botanical scrutiny. Renderings that date from the 1st millennium BCE allow, in fact, for a species determination. Since late portrayals of the plant are normally regarded as refinements on earlier interpretations (James 1966; Pärpola 1993), it is reasonable to assume that a botanical assessment of later materials is relevant to those of older origin.

Two distinctive forms of this mystical ‘world-tree’ are preserved on cylinder seals from the 2nd millennium BCE. One basic tree type is portrayed as a columnar plant that supports a luminescent object (Fig. 1a); another is depicted as a ramified, monopodial treelet (Fig. 1b, d). The former type presents a naked trunk that is generally lacking of lateral branches, save for a pair of opposing horn-like offshoots at the apex of the plant which most art historians are inclined to interpret as a crescent moon. In like manner, a radiate structure that is cradled by the plant’s horizontal crescent is normally interpreted as a solar, lunar or astral motif (Fig. 1a; Danthine 1937, Fig. 188, 189, 438, 497, 498, 502–504).

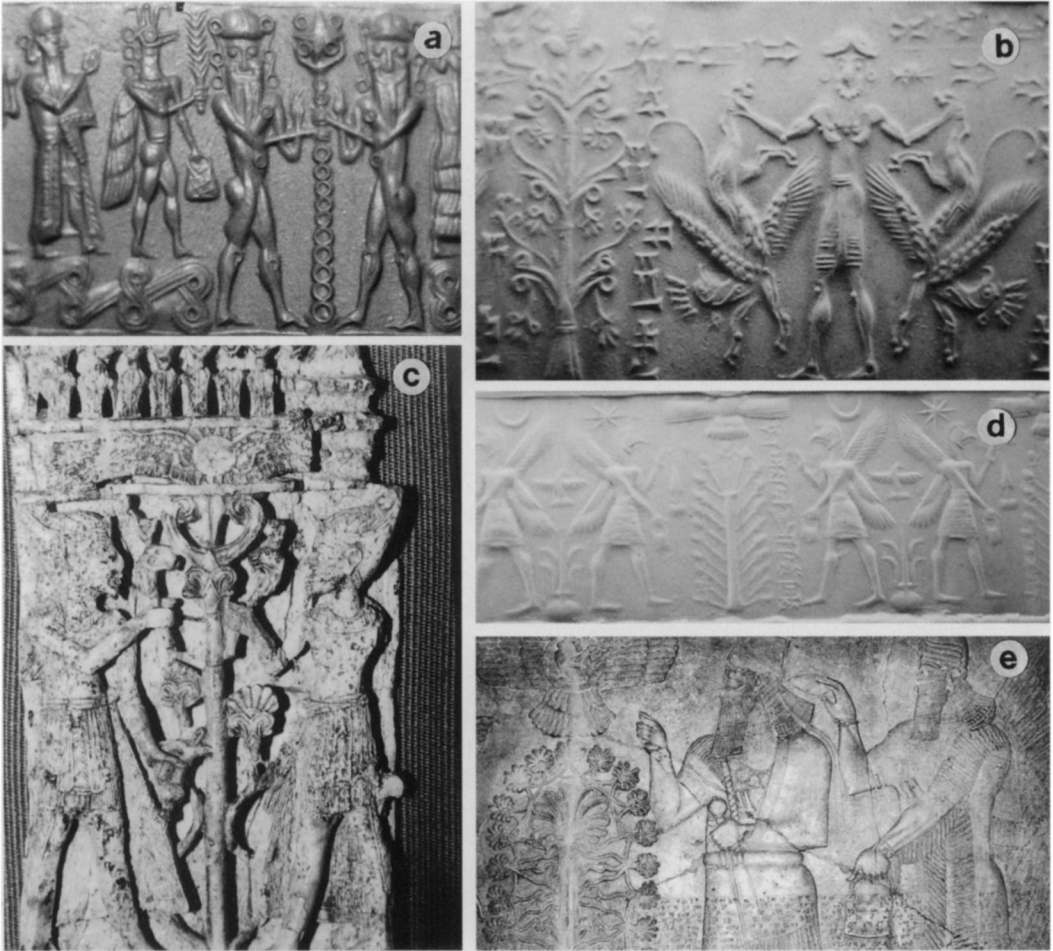


Fig. 1. a–e. Historical depictions of the Mesopotamian and Levantine sacral tree. **a.** Two heroic figures uphold a sacral tree while a quasi-personified griffin emerges from a watery substrate to sanctify the plant with a bucket and branch. An ascending pair of serpentine stems supports a crescent moon (horns or branches?) and tetramerous sun (or flower?). Mitannia. 1350–1250 BCE (Louvre Museum). **b.** A divine man subdues two griffins that once roosted in the tree of life. The monopodial tree produces a series of opposite branches that terminate in volutes. Floral shoots depicted as stylized ‘palmettes’ grow from the axils of lateral branches and a strobilus is held erect at the apex. Mitannia. 1350–1150 BCE (Boston Museum of Fine Arts). **c.** Two divinities (or priests?) stand before a pillared, blue-pigmented tree of life. Lateral branches produce lotus blossoms in the form of stylized palmettes. Note that the central axis supports a horned structure and a winged disk. Two volutes and a deltoid appendage subtend the tree’s apex and each palmette, these features suggesting the profile of a tetramerous flower. A series of cobras stand guard over the tree, each supporting a moon and solar disk upon their head. Note that the diadem of the serpents mirror the image of the sacral tree’s crown. Phoenician craftsmanship at Nimrud (Kalakh), Iraq. 9–8th BCE (British Museum). **d.** Personified griffins stand before a budding or fruiting sacral tree with buckets in hand. The symbol of the sun or a sun-god, the winged disk, illuminates the plant. Mesopotamia. 883–614 BCE (Boston Museum of Fine Arts). **e.** King Assurnasirpal II stands before a sacral tree while a winged genius anoints him with a bucket and cone. A sun-god known as Shamash or Assur is observed emerging from his solar disk to witness the sanctification of the sovereign. Palace of Assurnasirpal II, Nimrud, Iraq. 883–859 BCE (British Museum).

As a whole, this highly stylized motif is thought to symbolize a vegetative entity that governs solar and lunar cycles, the changing of seasons, and annual cycles of plant growth.

This image is often associated with a host of divine human figures, one prevailing form of which is rendered with a naked body, elongated face, broad nose, curly tresses, a beard, and rounded crown (Fig. 1a, b). This man is often accompanied by a variety of animalian spirits and fully robed anthropomorphic gods and goddesses, the latter of whom tend to congregate about the sacred plant to pay homage, often in association with aquatic environments (Fig. 1a; Danthine 1937, Fig. 139, 176, 254) or upon the tree's cosmic mountain (Danthine 1937, Fig. 502, 624, 625, 683, 691–695). The predominant naked figure often subjugates lions, bulls and leogryphs by hoisting the mythical creatures into the air by their hind legs or tails (Fig. 1b, 5c). While the underlying meaning of this bold posture is still not fully understood, it seems to relate in some way to the gaining of access to the sacred tree (Fig. 1a, b, d, e, 2d, 5a, b). In like manner, the subordinate animals appear to play a dualistic role in Middle Eastern iconography, as either protectors or devotees of the divine plant. In the latter capacity they conventionally carry a short-handled pail (or purse?) in one hand and a vegetative motif in the other (Fig. 1a, d, e). They perform an act of consecration that historians are given to interpret as an 'anointing,' 'smearing' or 'watering' of the sacral tree (Black and Green 1992:16, 170; Frankfort 1939:204, 1989:160–162; Goldsmith 1928: 101).

These same mythical figures congregate around a cosmic tree that produces opposite, tiered offshoots (Fig. 1b–e, 2a). Lateral branches of this sacred tree often bear stalked palmettes in their axils (Fig. 1b, c, e, 2d, 5a, b) and stylized hooks, volutes, fruits or cone-like structures at their tips (Fig. 1b, c, d, 2d, 4a, b; see also Black and Green 1992:80; Danthine 1937, Fig. 380, 407, 409–412, 580). This particular tree is clearly distinguished on a morphological basis from its pillared and branchless counterpart, yet historians are inclined to recognize it as a variant rendering of the branchless tree (Fig. 1a), as we occasionally encounter hybrid motifs that exhibit vegetative nuances of both tree types (Parpola 1993, appendix A, pp. 200–201). Moreover, we observe the same bizarre sphinxes and personi-

fied griffins performing the same unusual rites on both motifs (Fig. 1a, d, 2d, 5b).

By the middle of the 1st millennium BCE we note that the sacral tree has undergone few changes, as the plant still exhibits a naked, columnar trunk, a palmate canopy, and close contacts with the sun, winged humans, or various animalian spirits (Fig. 1e, 2a, c, 5b). Though still stylized at this late date, some of the plant's vegetative features are now executed with increasing realism, as exemplified by the sacral trees of Assurnasirpal II at Nimrud and Nineveh during the 9th c. BCE (Fig. 1e, 2a). These large (1–2 m tall) and detailed interpretations of the archaic tree can be traced from wall paintings of the same motif at Kar Tukulti-Ninurti during the 12th century BCE (Frankfort 1989; Fig. 152, 153), and match closely to renderings of the tree on ivory fragments of contemporaneous age (Fig. 1c, 2d, 5b). A general consensus has been reached that all of these vegetative motifs are symbolic of power, fertility and everlasting life, yet there is little agreement as to how the images relate specifically to religious beliefs and myths of Mesopotamia and the Near East (Parpola 1993).

Archeologists and art historians often identify these motifs as stylized date palms (Fig. 2a), owing primarily to the plant's palm-like aspect and to the importance of dates in the diets and local economies of Middle Eastern cultures (Danthine 1937; James 1966:98; Mazar 1961, 4:71; Parpola 1993; Porter 1993; Tylor 1890). Other commentators prefer, however, to refer to these symbolic images as 'pillars of heaven' (Frankfort 1939:276; 1989:248, 296), 'palmetto trees' (Keel and Uehlinger 1998:199, 234), or 'Cypriote palmettes' (Frankfort 1989:323), so as to emphasize their magical significance. Labels of the latter type are often used, for example, in reference to sacral trees that are encountered on reliefs inside Assurnasirpal's temples during the 9th century BCE (Fig. 1e, 2a), since the general appearance of these executions do not suggest the image of a date palm *per se*. While Assurnasirpal's trees do possess a pillared trunk and palmate canopy, we note that a series of small palmettes surround the tree in an array that is inconsistent with palm morphology. The small palmettes are linked by smooth and pliable stems that tie off directly to the plant's pillared axis, ostensibly to establish a visual relationship between the repeating palmettes and the sacral

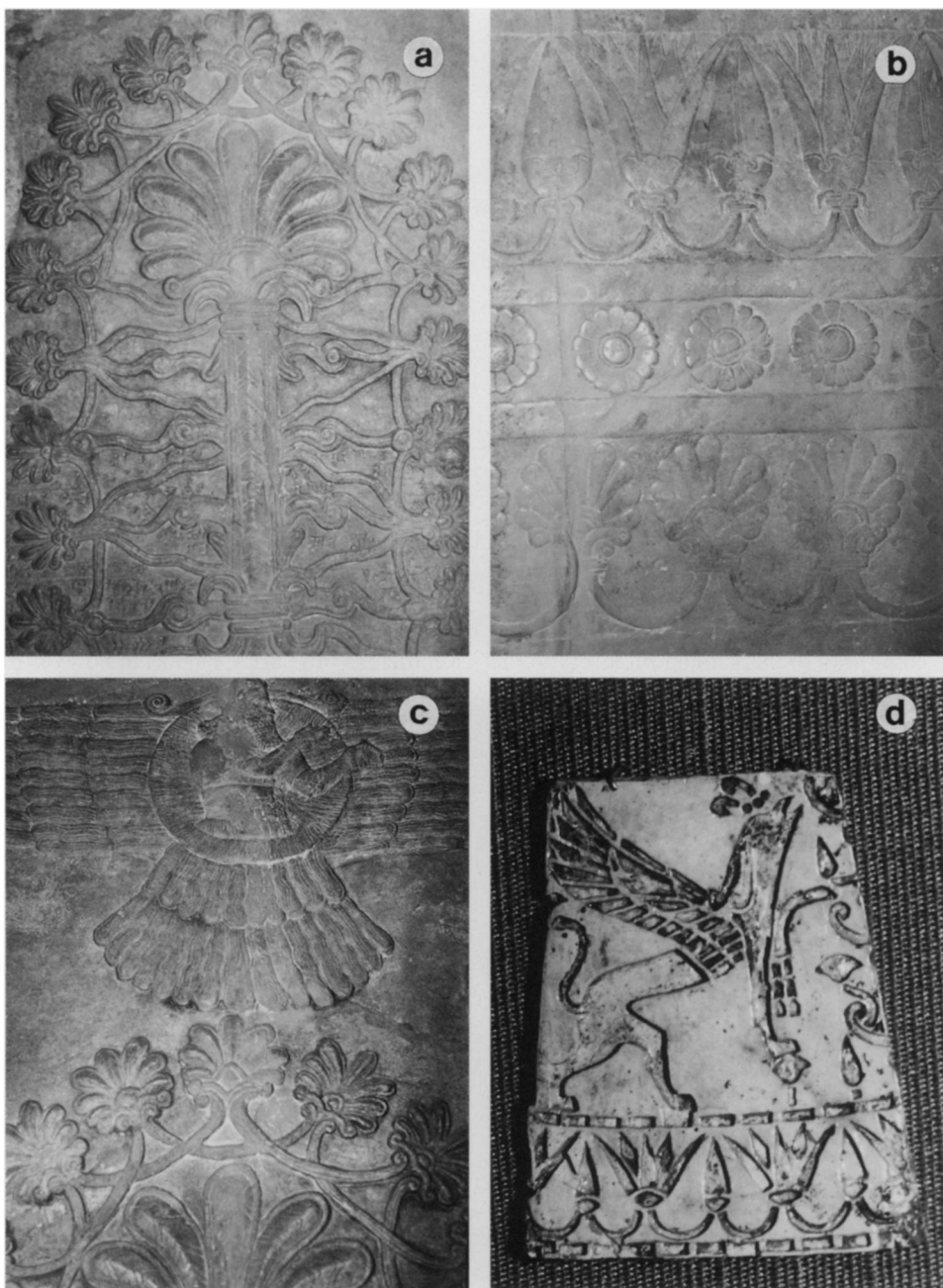


Fig. 2. a-d. The Lotus as a 'Pillared Palmette.' **a.** Assurnasirpal's sacral tree normally exhibits a columnar trunk and the profile of an apical rosette (i.e., the classical 'palmette'). The surrounding palmettes match closely with the tree's crown and are linked by a pair of serpentine stems. Extensions of the stems tie off to the plant's central axis. Nimrud, Iraq. 883–859 BCE (British Museum). **b.** A door panel of Assurnasirpal's palace equates a series of palmettes with a running link of lotus blossoms. Radial views of the solar flowers are portrayed as rosettes. Alternating bud-and-blossom motifs symbolize the natural process of rebirth and the metaphysical concept of immortal life. Nineveh, Iraq. 704–681 BCE (British Museum). **c.** A solar god emerges from the symbol of the sun—a winged orb—to give life to the sacral tree. Nimrud, Iraq. 883–859 BCE (British Museum). **d.** A crested griffin stands upon a lotus flower and reaches toward the tree of life. Branches of the immortalizing plant support alternating lotus buds and blossoms (a symbol of eternal recurrence) and reflect the image of a running bud-and-blossom motif at the base of the tree. Residues of blue pigments remain on the flower's petals and the griffin's wings. Nimrud, Iraq (of Phoenician origin). 9–8th c. BCE (British Museum).

tree's canopy (Fig. 2a, c). We also note that the cluster of appendages that comprise each palmette do not suggest the morphology of a date palm's pinnate blades (Fig. 3a), but rather a simple, narrowly elliptical, foliaceous structure (Fig. 1c, e, 2a, b, 4d, f, 5b, 6a). Hence one is hesitant to identify the plant's palmate spray of 'leaves' as a palm canopy. To further question this association, we note that the rosy stems of the plant occasionally give rise to a peculiar fruit that bears no resemblance to a date (Fig. 4b, d, f; Danthine 1937: Fig. 426, 428, 431, 440, 448). On other occasions the stylized bower produces a series of stylized strobiloid structures (Fig. 1b, 6a-c; Danthine 1937, Fig. 380, 407, 409-412, 482, 490, 580, 821; Loud 1939, Pls. 20, 21), which art historians are apt to identify as 'cones', 'pine-cones', or 'pineapples' (Black and Green 1992:46; Menant 1888:64, Pl. VIII,X; Parpola 1993:183). These recurrent features are also discordant with physical attributes of a date-palm.

Assurnasirpal's trees maintain a close symbolic association with the sun, but at this point in time the solar orb is removed from the boughs of the plant and placed above the motif in the form of a winged disk (Fig. 1e, 2c). A divinity that emerges from the center of the winged orb is normally interpreted as one of various sun-gods that were worshipped by the Sumerians, Akkadians, Assyrians, Babylonians and Perso-Aryans, known variously as Utu, Shamash, As-sur, Marduk or Ahura Mazda (Black and Green 1992:129, 182-184, 186). It has proven difficult, however, to identify which of these gods is depicted specifically in Assurnasirpal's palaces at Nimrud and Nineveh, since the same winged-sun motif has been employed by many and various cultures throughout the fertile crescent from the 3rd-1st millennia BCE. Furthermore, all of the aforementioned divinities share close mythic and iconographic affinities with an immortalizing tree of life (see below).

Although we occasionally encounter the unmistakable image of a date palm on temple reliefs and cylinder seals that commemorate historical scenes [i.e., as deduced by their columnar trunks, persistent leaf bases, pinnate leaves, and spathate inflorescences (Fig. 3a; see also Danthine 1937, Fig. 13, 14, 18, 19, 25-27; Roaf 1998:189, 190)], images of date palms are only rarely associated with mythical scenes (Danthine 1937, Fig. 15, 16, 20, 24, 31, 34). Religious and

fantastical scenes usually employ a highly stylized interpretation of the world-tree, which, as earlier noted, is often surrounded by an arching network of supple, succulent stolons (Fig. 1b, e, 2a, c, d, 4d, f, 5b, 6c). Or more importantly, we notice that the sacral tree's palmettes are frequently drawn across a horizontal plane (Fig. 2b, d, 4d, f, 6c), in which arrangement they seem to suggest a floral motif rather than a branching canopy. This specific association is clearly implied on a stone panel that once decorated a doorway of Assurnasirpal's chambers (Fig. 2b), where horizontal alignments of repeating palmettes are unequivocally equated with a lotus bud-and-blossom motif.

The frequent association of lotus blossoms and palmettes in the visual arts of the Middle East is of critical importance for several reasons. First, the classical lotus bud-and-blossom motif that we encounter in Egypt as early as 3000 BCE and in Mesopotamia by the second millennium BCE is widely recognized as a symbol of rebirth and immortal life. Hence the symbolic inference of a sequential bud-and-blossom motif agrees conceptually with the metaphorical concept of an immortal 'tree of life'. Secondly, we note that Mesopotamian palmettes are usually subtended by a pair of lateral volutes with a deltoid or rounded appendage fixed between them (Fig. 1c, 2a, c, 5a, b, 6c). This conventional feature of a palmette suggests that we are not dealing with a palm canopy, but rather a tetramerous, polypetalous flower that displays three of its four sepals in profile (Fig. 2b, 3d, 4a, 5c, 6b). If this is the case, then we are compelled to identify the 'sacral tree' of Mesopotamia as a stylized lotus shoot rather than a palm tree, for flowers of the Egyptian lotus (*Nymphaea nouchalii* Burm. f.; = *N. caerulii* Savigny *pro syn.*; Verd-court 1989) are large, tetramerous, and solitary (Fig. 3c, d). In contrast, flowers of a date palm are miniscule, hexamerous, and born numerously on a highly ramified, spathate inflorescence (Fig. 3a). Hence it follows that the columnar axis of the sacral tree does not represent the woody trunk of a date palm (Fig. 3a), but rather an upright, naked, succulent lotus stalk (Fig. 2c, d, 3c, d, 4e).

Mesopotamian artisans often placed stalked palmettes in the hands of dignitaries and enthroned kings on temple reliefs (Danthine 1937, Fig. 904-908, 914, 924, 1095; Frankfort 1989, Fig. 231, 358; Mazar 1961, II:143, 270; Roaf

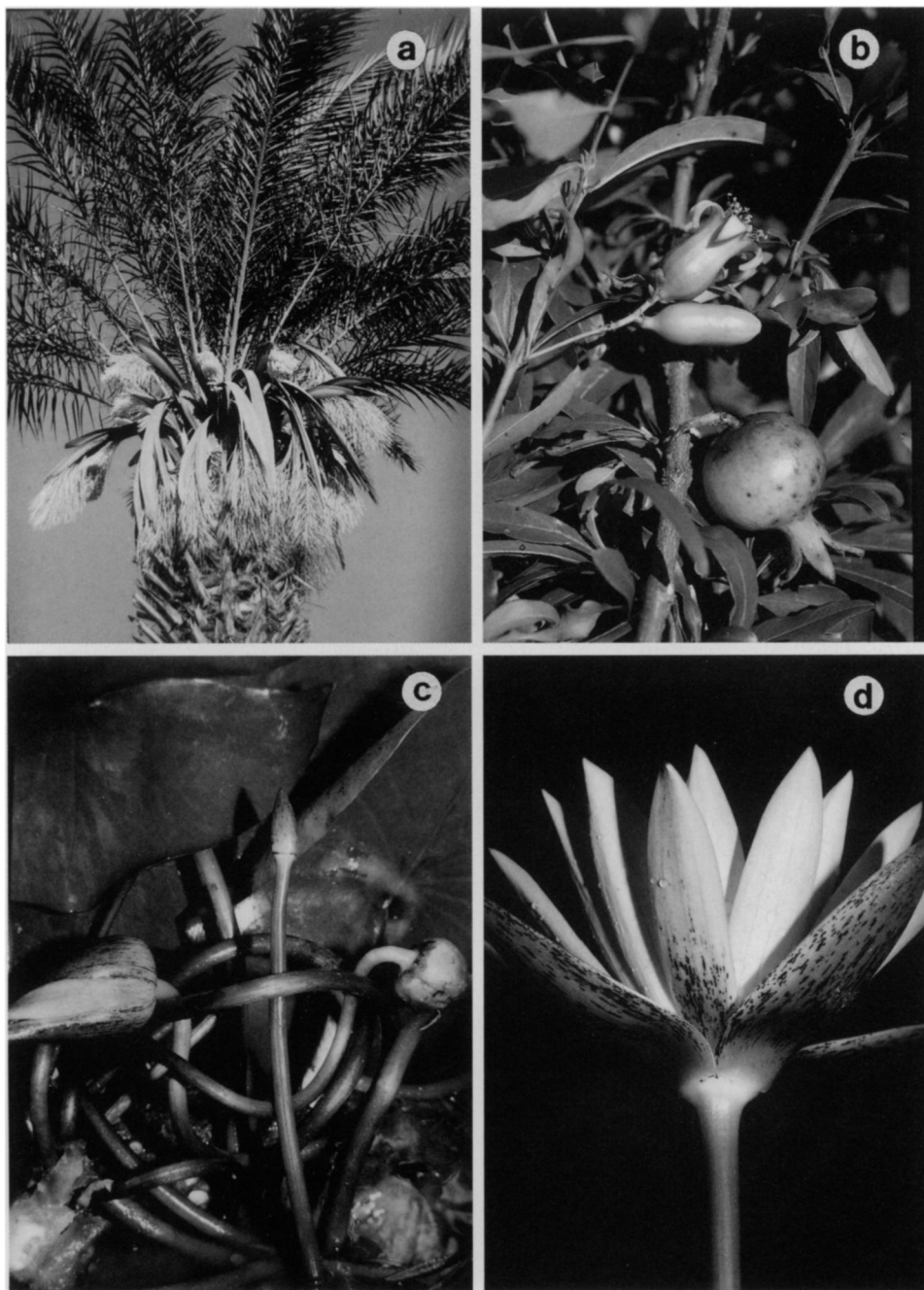


Fig. 3. a-d. Plants identified with the Symbolic Tree of Life. **a.** Growth habit of a flowering date palm (*Phoenix dactylifera*). Note the persistent leaf bases on a broad, woody trunk, pinnately compound leaves, dangling spathes and highly ramified flowering stalks. **b.** Flowering and fruiting stalks of a pomegranate (*Punica multiflora*). Note that the flowers and fruits are born on thin, foliaceous, ramified, woody stems. **c.** Growth habit of the 'Egyptian lotus' or 'Lily of the Nile' (*Nymphaea nouchalii*). Note that the plant produces a succession of solitary flowers born on thick, naked, succulent stems. The budding stalks suggest the image of a rising serpent when they emerge from the water. Fruiting stalks recoil in a serpentine manner as they retract their pollinated flowers back into the water. **d.** The 'Egyptian lotus' displays four outer sepals and numerous azure petals when in bloom. Note that the flowers are always born singly at the apex of a thick, succulent shoot.

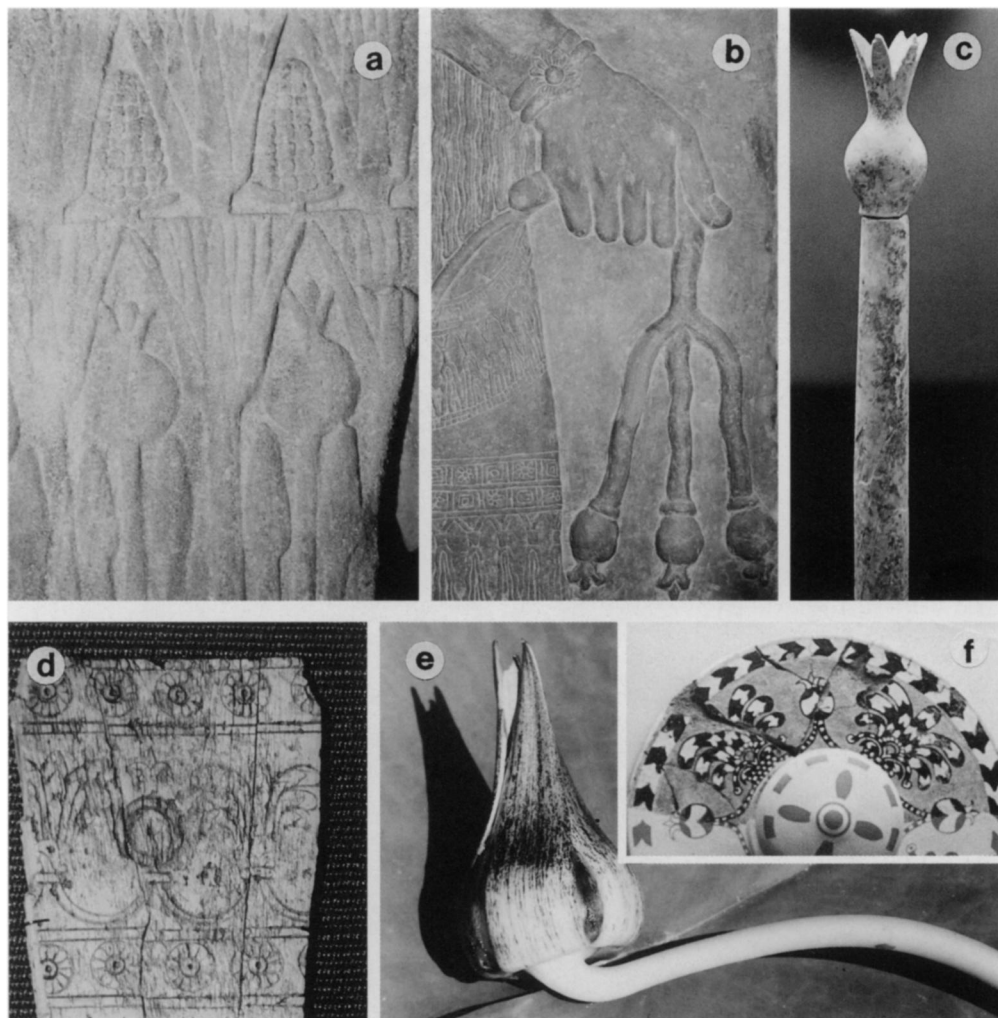


Fig. 4. a–f. The fruit of the immortalizing tree of life. **a.** Stylized lotus fruits are integrated into a lotus bud-and-blossom motif on an offering table that was dedicated to the sun-god Amun at Karnak. Thebes, Egypt. 9th c. BCE (British Museum). **b.** A priest carries three lotus fruits while a king (not seen) leads the way with three lotus flowers in hand (Frankfort 1989, Pl. 199). The supple, succulent stems of the fruits suggest the image of a lotus peduncle rather than a pomegranate stem. Khorsabad (Dur Sharrukin), Iraq. 8th BCE (Louvre Museum). **c.** Ivory scepters fashioned in the image of the fruiting lotus shoots are frequently uncovered in archeological zones of the Near East. The rod presumably symbolizes fertility and the vital powers of the king. Fosse Temple, Lashich, Israel. 14th c. BCE (British Museum). **d.** Numerous ivory pieces that once decorated palace furniture of Assurnasirpal present a running lotus flower-and-fruit motif. Nimrud, Iraq. 8th c. BCE (British Museum). **e.** Fertile shoots of the Egyptian lotus exhibit succulent stems, a swollen ovate fruit, and clasping, accrescent sepals. **f.** A glazed wall plaque displays bluish palmettes that alternate with a lotus fruit. Nimrud, Iraq. 8th c. BCE (British Museum).

1998:171, 178), in which context historians are inclined to identify them as flowering lotus shoots. We also note that paintings and ivory carvings of palmettes were intentionally rendered in blue by the use of lapis lazuli stone insets or pigments made from crushed azurite

and oxides of copper (Fig. 1c, 2d, 4f; Parrot 1961:266). Since flowers of the Egyptian lotus are blue-pigmented, and those of a date palm cream-colored, we may be sure that the palmettes were intended to represent a stylized lotus flower.



Fig. 5. a–d. Egyptian influences on Mesopotamian iconography. a. Mythic motifs on a silver Phoenician bowl integrate Egyptian and Near Eastern motifs. A personified image of an Egyptian sun-god (Horus/Harpocrates) is seen arising from a lotus flower that sprouts beside a sacral tree. The tree produces stylized lotus buds and flowers on its lateral branches. Cyprus. 7–8th c. BCE (British Museum). **b.** A ram-headed sphinx strides across a lotus grove as he approaches a lotiform tree of life. Although this winged caprid resembles the Egyptian sun-god known as Khnum, he symbolizes a Near or Middle Eastern divinity. Note that the chimera

Numerous ivory engravings and figurines of Phoenician origin lend credence to a floral interpretation of the sacral tree's palmettes. An exemplary specimen from Assurnasirpal's palace at Nimrud portrays, for example, a winged sphinx striding across a lotus bud-and-blossom motif as he approaches a tree of life (Fig. 2d). Although this damaged fragment does not provide a clear view of the plant's pillared trunk, we do observe the conventional hooked branches of the sacral tree. We also pay heed to alternating lotus buds and flowers that sprout from the tips of lateral shoots (Fig. 1c, 5a, b; see also Danthine 1937 for hundreds of examples, and Mazar 1961, II:214, 215 for examples from Samaria and Megiddo, Israel). We note that the griffin has placed one forepaw upon a full-blown lotus flower as he extends another protective paw toward a blue-pigmented lotus bud on the sacred tree. Hence the upwardly mounting, stylized buds and blossoms on the tree clearly mirror the image of a lotus bud-and-blossom motif that runs along the lower border of the fragment.

The symbolic equivalency of the palmette and lotus blossom is further implied by placing alternating images of a solitary fruit between each flower (Fig. 4a, d, f; D'Alviella 1956, Fig. 63, 64, Pl. IV). This fruit is consistently rendered with an ovoid pericarp and persistent, clasping sepals. While art historians and botanists are inclined to identify the fruit as a pomegranate, *Punica multiflora* Hort. (Avigad 1990; Halpern 1992; Keel and Uehlinger 1998:360; Moldenke and Moldenke 1952:191–192), there is ample reason to question this determination. For one, pomegranates share no ecological relationship with date palms in the natural world, except for the fact that they are both semi-domesticated species. Secondly, pomegranate plants share few, if any, morphological characteristics with a palm tree (Fig. 3a, b). Finally, we note that fruits

of the sacral tree are often incorporated into stylized configurations of palmettes and lotus motifs in Mesopotamia (Fig. 4d, f) and Egypt (Fig. 4a), suggesting that the fruit may share a symbolic relationship with water lilies. Indeed, an Assyrian dignitary that dangles a cluster of three sacral fruits (Fig. 4b) is preceded on the same relief by a king that holds three lotus flowers in hand (Frankfort 1989, Fig. 199; see also Danthine 1937, Fig. 119, 914). This historical scene confirms that Mesopotamian artisans recognized some sort of biological or symbolic relationship between the stylized fruit and lotus flower in religious rituals.

Indeed, if we consider the peculiar morphology of the distinctive fruit, we recognize that the fruiting body is more readily identified as a lotus berry than a pomegranate, since ovoid *Nymphaea* berries are always born at the apex of thick, flexible, succulent shoots, and retain accrescent sepals that clasp and surpass the pericarp (Fig. 4a–f). These diagnostic characteristics accord in every way with fruiting structures of the sacred tree (Danthine 1937: Fig. 423–432, 440, 448), yet they contrast remarkably with pomegranate fruits, which normally develop as lateral shoots on thin, rigid, highly ramified, foliaceous stems (Fig. 3b). Hence we are bound to interpret the running palmette-and-fruit motif as a permutation on the lotus bud-and-blossom motif.

PHENOLOGICAL AND MORPHOLOGICAL CHARACTERISTICS OF THE EGYPTIAN LOTUS

The convention of presenting three lotus flowers or fruits in the hands of Mesopotamian gods and dignitaries (Fig. 4b, 5d; Danthine 1937, Fig. 488, 524, 818, 909, 913–915, 919) probably derives from the ancient Egyptian practice of portraying lotus blossoms in triplicate (Emboden

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and sacral tree carry a similar crown that is formed by a sun and moon. A similar crown is observed on the sacral tree's guardian serpents in Fig. 1c. Serpentine lotus stems issue from the feet of two personified aquatic divinities. Ft. Shalmaneser, Iraq. 8th c. BCE (Metropolitan Museum New York). c. A lotus-goddess stands upon a lotus flower as she raises a pair of flowers to the sun. A solar disk bearing two Egyptian serpents (uraei) symbolizes power and divinity, as do the lions which this goddess has hoisted into the heavens by the hind legs. The masculine equivalent of this floral goddess is seen in Fig. 1b. Ft. Shalmaneser, Iraq. 8th c. BCE (Metropolitan Museum New York). d. An Egyptian-styled lotus-goddess emerges inside a winged disk so as to symbolize the immortal sun and flower (compare Fig. 1e). She raises lotus buds from her feathered orb while a priest upholds three of her budding lotus shoots to the 'Queen of Heaven'. Ft. Shalmaneser, Iraq. 8th c. BCE (Metropolitan Museum, New York).

1978, 1989). As noted by Emboden, this custom relates to the natural behavior of lotus flowers, which open and close thrice over the course of three days (Meeuse and Schneider 1979). It is also widely acknowledged that the symbolic relationship between the Egyptian lotus and sun is based on the natural color scheme and radial symmetry of lotus blossoms, for flowers of *Nymphaea nouchalii* display a golden ovarian disk inside a sky-blue corolla (Fig. 1c, 2b, 5c, d, 6b), suggesting the image of a yellow sun in an azure sky. Water lily blossoms also share a close behavioral connection with the sun by the idiosyncratic manner in which they open their petals at dawn and close them before the onset of dusk. Hence Egyptian and Middle Eastern iconographers and mythographers recognized a natural symbolic relationship between their sacred flower and the sun.

The Egyptian lotus also shares a close symbolic association with various mythical serpents known variously as Edjo, Buto, Apep, or Seth. Images of these symbolic creatures appear frequently among reliefs of lotus groves the conventionally encircle Egyptian temples, or otherwise dangle from blue-winged, solar disks that decorate the hallways and portals of temple interiors (Fig. 6c). These standard iconographic forms are apparently based, once again, on the general morphology and natural behavior of lotus shoots, as the latter structures bear a distinct likeness to a snake when they emerge from the dark recesses of their aquatic habitats. Their tubular stalks suggest the image of a rising serpent's body, while their swelling buds suggest the aspect of a serpent's heads (Fig. 3c). Lotus stalks also exhibit a decidedly snake-like behavior following the third day of anthesis, when their peduncles recoil in a serpentine fashion to draw their pollinated flowers back into the water (Fig. 3c; Meeuse and Schneider 1979). Continually rising from, and retreating into, the waters of the rivers and lakes, lotus shoots were envisaged symbolically as the living embodiment of a recurrent sun and serpent: hence the widespread Egyptian and Middle Eastern iconographic custom of associating coiling snakes with budding and flowering lotus stalks (Fig. 1a, 2a, b, c, 4b, 5b; see also Danthine 1937, Fig. 152, 377, 615; Gillispie and Dewachter 1987, Vol. 4: Pl. 29, 41.2, 67.18; Keel and Uehlinger 1998, Fig. 336). To further develop this symbolic relationship, Egyptians often placed the

emblem of a sun and moon upon the serpent's head to identify the plant and animal with their sun-like flowers (Fig. 1c, 5c). This same stylistic nuance is frequently encountered in Near Eastern iconography (Fig. 1a, c, d, 5a, b).

The plant's habit of producing a succession of lotus buds, flowers, and fruits is fittingly exemplified, therefore, by the classic bud-and-blossom motif or flower-and-fruit configuration (Fig. 2b, d, 4a, d, f, 5a, 6c, 7b). In fact, all of these plant parts were employed as a symbol of vitality or eternal life. Images of lotus fruits were often carried by kings and aristocrats in the form of ivory scepters throughout the Middle East (Fig. 4c; Avigad 1990; Halpern 1992), for example, on a specimen of which has been traced directly to Solomon's temple in Jerusalem (Avigad 1990; Halpern 1992). This piece gives us reason to believe that kings of his day may have employed the image of a lotus fruit to signify their close relationship with the tree of life.

EGYPTIAN INFLUENCES ON THE SACRAL TREE MOTIF

Art historians have long acknowledged that iconographic schools of art in the Near and Middle East were influenced by the Egyptians (Black and Green 1992:84; Cline 1995; Frankfort 1989; Jones 1986:28–29; Shaw 1992:29), and we frequently encounter the intermingling of Egyptian and Middle Eastern deities and motifs on ancient ivory carvings and metalwork that originate from these regions of the world. We observe, for example, a Near Eastern rendering of the tree of life beside an Egyptian-styled lotus blossom on a silver Phoenician bowl (Fig. 5a). These motifs are presented in a mythical context by associating the lotus-born Egyptian sun-god known as Horus or Harpocrates with a pair of Near Eastern deities, the latter of whom pluck lotus buds and blossoms from the corniculate branches of a sacral tree (Fig. 5a). Similar cross-cultural associations of Egyptian and Near Eastern divinities are observed among a large stash of Phoenician ivories that were unearthed from Assurnasirpal's palaces at Nimrud and Nineveh. One specimen portrays a winged caprid with recurved horns striding across a lotus grove towards a lotus-tree of life (Fig. 5b), his general form and natural surroundings suggesting those of the Egyptian capriform sun-god known as Khnum. Statues of Khnum once lined the main entrance to the temple of Karnak on

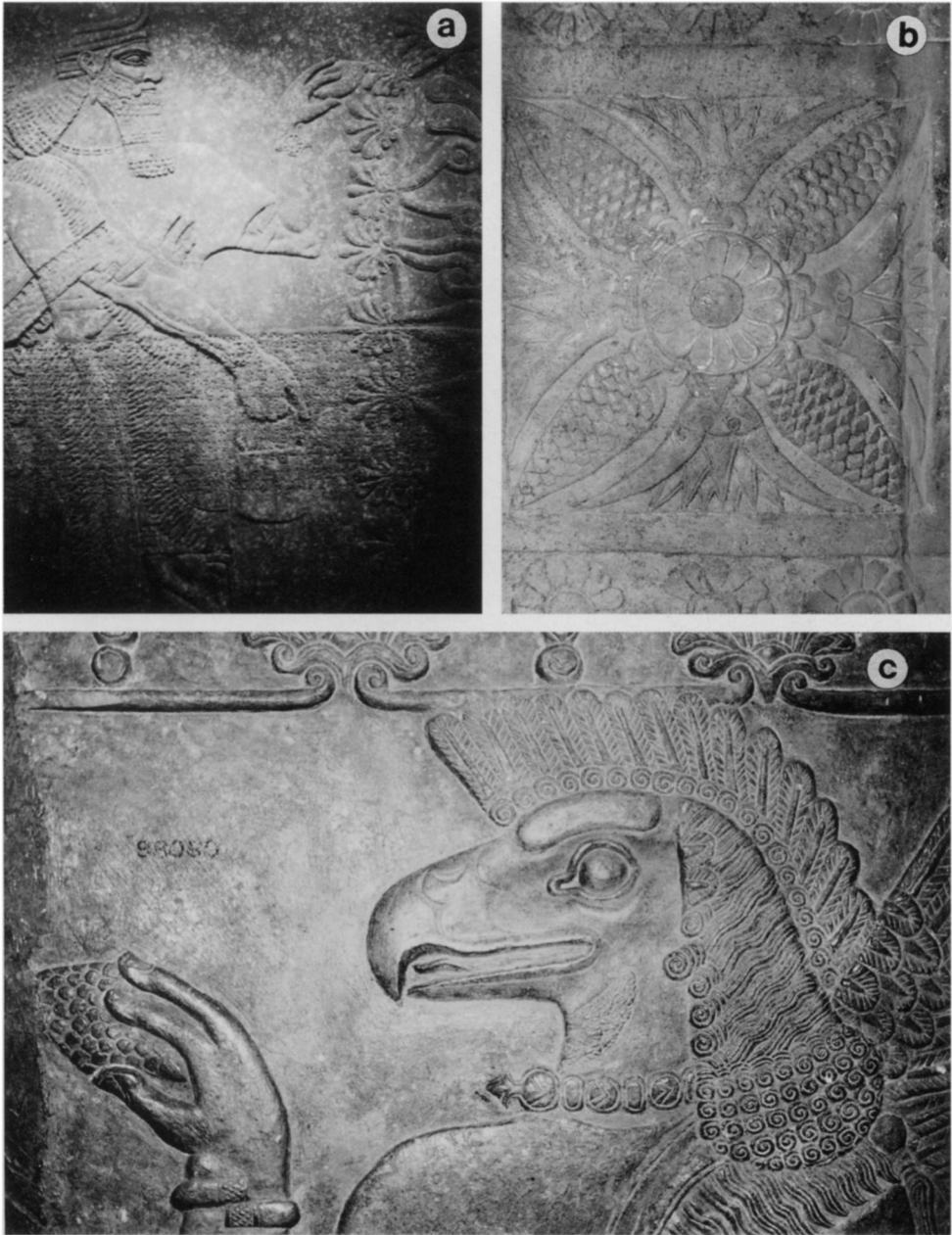


Fig. 6. a–d. The anointing cone and Sacred Lotus. **a.** A winged divinity (*lamassu* or *shedu*) holds a pail and touches his cone to a flower on the lotus-tree of life. **b.** He may be extracting immortalizing waters from the plant for the benefit of the king or anointing the plant to insure its resurrection. Nimrud, Iraq. 883-859 BCE (Boston Museum Fine Arts). **c.** The enigmatic cone of griffins and winged genii are often associated with the sacred lotus. Four alternating images of the flowers and cones face the four cardinal point of space, ostensibly to identify the plant as a universal principle. Nineveh, Iraq. 704-681 BCE (British Museum). **d.** A griffin holds a cone before the world-tree. Note that remnants of a lotus bud-and-blossom motif run along the upper border (see also Fig. 2b). Nineveh, Iraq. 704-681 BCE (British Museum).

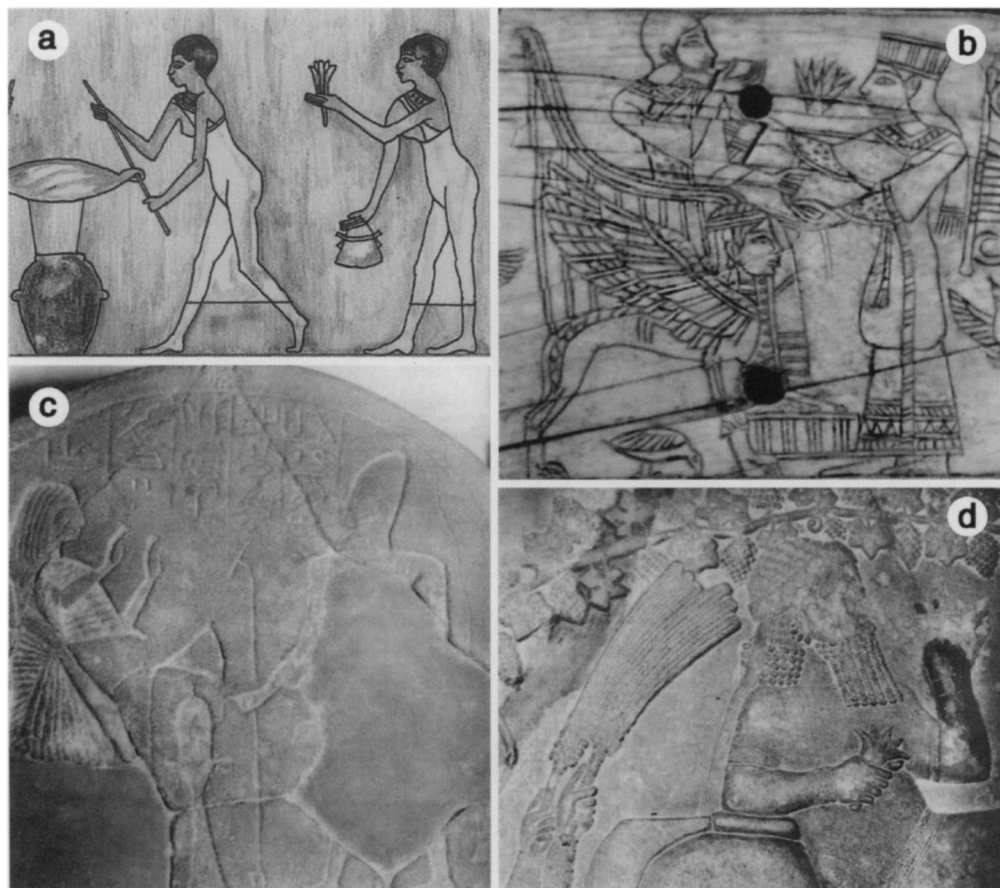


Fig. 7. a–d. The lotus in libation scenes. **a.** Lotus flowers were extracted en masse by the Egyptians. Note that the flower collectors carry the same buckets that are held by Mesopotamian griffins, priests and winged genii. Beni Hasan, Egypt, 2nd millennium BCE (redrawn from Mazar 1961, II:143). **b.** An aristocrat of Canaan is offered a lotus flower and libation cup after returning from a successful military campaign. Note that his seraphic throne is supported by a pair of griffins, whose primary roles are to protect and sanctify the sacred tree of life. Megiddo, Israel. 12th c. BCE (courtesy of the Israel Antiquities Authority). **c.** A lotus libation is offered by a Canaanite priestess to “Seth of Sapuna” (= ‘Baal of Sapon’). Note that the god carries an Egyptian ‘waz’ scepter even though he is a Levantine god. Temple of Baal, Ras Shamra, Syria, 13th BCE (Louvre Museum). **d.** Assurbanipal is offered a libation in a lotiform cup. He holds a lotus in his hand as he drinks in his garden of delight. Nineveh, Iraq, 6th c. BCE (British Museum).

the Nile (Murnane 1996:288, 306), and also appear among the massive lotus columns that occupy the inner confines of this famous sanctuary. Mesopotamian renderings of this god (i.e., at least in form) pressed deep into the heart of Assyria by the turn of the 1st millennium BCE (Danthine 1937, Fig. 185, 237, 387, 489, 707), and continued to maintain their close associations with lotus groves. Like other Middle Eastern and Egyptian deities, he bears a sun and moon upon his head (Fig. 5b); and we note that the goat’s headdress mirrors the general aspect

of the sacral tree’s canopy, presumably to draw a symbolic connection between the mythical plant and animal.

A Middle Eastern goddess that is frequently encountered among Assurnasirpal’s ivory collections (Fig. 5c, d) similarly exhibits the distinctive bodily form and hairstyle of various Egyptian lotus-goddesses (i.e., Maat, Isis, Hathor, and Nut). In one specimen (Fig. 5c) she seems to represent the female personification of a lotus plant, as her stout body seems to take the place of a lotus stalk when she stands upon

a lotus podium to raise her blossoms before an Egyptian-styled sun (Fig. 5c). The goddess grasps two lionesses by the hind legs to signify her feminine prowess and suggest her general equivalency to various masculine gods of the Middle East (Fig. 1b). This goddess of vegetation also identifies herself with the sun (Fig. 5d), in which guise she emulates, once again, various masculine sun-gods in Mesopotamia and Persia (Fig. 1e, 2c; Frankfort 1989, Fig. 428; Rauf 1998:163, 219). Yet she maintains her close association with the sacred lotus by presenting a pair of buds from her radiant body. While she brings life to the proverbial scion of the sun (i.e., lotus shoots), a priest pays reverence by offering her a bouquet of three lotus buds (Fig. 5d).

THE SACRAL TREE IN RELIGIOUS RITUAL

As already mentioned, the tree of life is often protected by various chimeric creatures, including griffins (Fig. 1a, b, d), winged humans (Fig. 1e, 5a, 6a), scorpion-men (Frankfort 1939:201, Fig. 33b, c) or fish-men (Black and Green 1992: 83). These hybrid creatures frequently place a cone-like object upon the sacred tree's palmettes or above a king's head (Fig. 1e, 6a, c; Porter 1993). One current interpretation of this recurrent visual theme identifies the cone as the staminate inflorescence of a palm tree, which some commentators believe was held before the tree and king to simulate the act of fertilization through pollination (Black and Green 1992:46; Porter 1993). This explanation is problematic, however, for several reasons, not least of which is the fact that the cone bears no resemblance whatsoever to a spathe, highly ramified, date palm inflorescence (Fig. 3a). Nor do we ever encounter images of date fruits or palm infructescences in these scenes. That the cone appears at the apex of lateral branches also discounts the notion that the cone represents a plant's flowering stalk (Fig. 1b; Danthine 1937, Fig. 380, 407, 409–412), since flowering shoots of a date palm invariably dangle below the tree's canopy (Fig. 3a; Danthine 1937, Fig. 409–412, 580).

An alternative interpretation of the cone ritual suggests that the king is being atoned or equated with the tree of life (Frankfort 1989:160; Parpola 1995). Whether this is the case or not, we may be sure that the cone relates in some way to the lotus plant, since the structure is frequently associated with lotus stems and flowers on seals

and temple reliefs (Fig. 6b, c; see also Danthine 1937, Fig. 380, 407–412, 490; Frankfort 1989: 197; Jones 1986, Pl. XII.1,4,14; Menant 1887, Pl. VIII.3). One might hypothesize that the cone represents a stylized bud or fruiting shoot of a lotus plant, but neither of these interpretations is entirely satisfying, since imbricate petals of a water lily are never exposed outside of the four tightly clasping sepals, and *Nymphaea* fruits are always ovoid (Fig. 2b, d, 6b, 7b). Whatever the underlying significance of this puzzling structure, the cone is often displayed as a recurring element in a metamorphosing vegetative structure, and probably relates to the concept of eternal recurrence.

The enigmatic cones and buckets that are customarily employed by winged genii in some sort of ritualistic context apparently relate to the giving or taking of life from the sacral tree (Fig. 1d, e, 6a). On the Nile River at Beni Hasan we observe the same distinctive bucket in the hands of Egyptian maidens, who employ the implement to harvest lotus flowers and express their juices into large urns (Fig. 7a; Mazar, 1961 II: 123, III:85, V:85). While archeologists usually suggest that this scene portrays the preparation of perfumes (Lucas 1948:106; Mazar et al. III: 85), there is now reason to believe that the plants were used for different purposes. Recent reports indicate that *Nymphaea* species produce opiate alkaloids (Diaz 1975) and that these psychotropic constituents have been employed by various peoples in ancient Egypt, India and Mexico to induce visions and euphoric states of mind (Emboden 1978, 1979, 1981, 1989; Nunn 1996:157; Spess 2000). Emboden (1978, 1979, 1981) suggests that water lily extracts were employed by Egyptian healers as a shamanistic medium, perhaps in concoctions of poppy and mandrake potions, based on recurrent associations of lotus flowers with drinking vessels in libation scenes. Emboden (1979) references various pharmacological studies that identify the narcotic properties and constituents of water lilies (Delphaut and Balansarad 1941; Descourtiz 1829:266; Pobeguín 1912:49), and confirms these reports by personal experimentations with macerated preparations of Egyptian lotus buds and flowers. He reports that he experienced narcosis, altered visual perceptions, and auditory hallucinations. Diaz (1975) later confirmed that Mexican water lilies produce isoquinoline alkaloids, and hypothesized that these substances are responsible

for the frequent occurrence of water lilies in mythic and ritualistic scenes on Mayan temples (Dobkin de Rios 1974; Diaz 1977; Emboden 1979, 1983; Rands 1953). More recently Spess (2000) has identified the western and eastern lotus (i.e., *Nymphaea* and *Nelumbo*, respectively) as psychotropic plants, suggesting that both plants have played a crucial role in the shamanistic practices of ancient Egypt and Asia.

Evidence for the use of lotus extractions in religious ceremonies extends far beyond the banks of the Nile, as we frequently encounter images of the Egyptian lotus in depictions of libations scenes in Mesopotamia, Israel, Lebanon, and Syria (Mazar 1961, I:121, II:45, 143, 270, III.102, IV:96, 140). A famous relief on the palace walls of Assurbanipal (a 6th c. BCE) portrays, for example, an eventual heir to Assurnasipal's kingdom with a lotus blossom in one hand and a damaged drinking vessel in the other (Fig. 7d). The sovereign's consort is positioned at the foot of his couch with a petaloid cup in her hand (Frankfort 1989, Fig. 217), suggesting that she drinks directly from a lotus blossom. This image compares closely with a libation scene portrayed on an ivory plaque from Megiddo, Israel, that dates from the 12th century BCE. Here we observe the presentation of a libation cup and lotus blossom to a Canaanite aristocrat (Fig. 7b). The peculiar chair on which this king sits is of notable importance, in that it matches with biblical descriptions of King Solomon's 'mercy seat', the sacred throne upon which the famous anointed kings of Yahweh's people sat when they consorted with the ark of the covenant in the holy of holies (*Exodus* IXX: 19–22; *Samuel* IV.6, VI.2; 1 *Kings* XXVII.25; *Hebrews* IX:5). Indeed, images of the original builder of Solomon's temple in Jerusalem, Hiram of Tyre (1 *Kings* V), occupies the same seaphic throne on his sarcophagus (Mazar 1961, II:143). And drinks from the same libation cup while holding a lotus in hand, while being surrounded by a running lotus bud-and-blossom motif. All of the aforementioned scenes bear close relation to an older relief (13th c. BCE) at Ras Shamra, Syria, in which a priestess stands before a lotus and libation vase as she pays reverence to the father of the Ugaritic pantheon, Seth of Sapon (i.e., Baal; Fig. 7c). Although this scene employs Egyptian imagery and is inscribed in hieroglyphs, the god to whom the stele is dedicated is decidedly Levantine.

THE SACRAL TREE IN MIDDLE EASTERN MYTH

Although many scholars have attempted to interpret the symbolic meaning of the sacral tree in the visual arts, seldom are efforts made to connect these visual motifs with mythical allusions to an immortalizing plant (Roaf 1998:226). Parpola (1993:165) asserts that the sacral tree of Middle Eastern iconographic traditions bears no direct relation to mystical trees in cuneiform texts, but he bases this conjecture on the erroneous assumption that the plant in question is a date palm. But if we consider that the sacral 'tree' is more accurately conceived as a stout aquatic herb with blue blossoms and a golden ovarian disk, we find ample reason to believe that pictorial representations of the world-tree reflect various mythical themes of the Middle East. Sumerian texts from the mouth of the Tigris River describe, for example, a primordial tree of creation that arose from the generative waters of Ur (i.e., near Eridu, Uruk and Eden) with "leaves" the color of lapis lazuli (Jacobsen 1970:1; James 1966:13; Langdon 1928). This plant is called the *giz-kin* in Sumerian tablets or the *kiskannu* in Akkadian texts (Langdon 1928). We presently know of no aquatic plants that produce blue foliage, nor do these characteristics apply to riparian palms or pines (James 1966: 13). Yet the blue leaves of this primeval plant may conceivably pertain to the Egyptian lotus, if we interpret the leaves of the *kiskannu* as the blue, foliose petals of a water lily.

The *giz-kin* or *kisannu* plant is closely associated with a riverine deity known as Enki, a Mesopotamian god of wisdom who once plied the banks of the Tigris River on a 'boat of lapis lazuli'. This god of sweet waters also shares close mythical associations with a popular sun-god (Marduk or Shamash), the latter of whom is occasionally identified as the offspring of the river god. Hence the close relation of these three mythical players—water god, sun god and primordial plant—seems to bear a direct relation to the iconographic confluence of these same symbolic images (Fig. 1a, c, d, 2c, 5a, b, c). The Babylonians referred to Enki by the name of Ea, and symbolized this god of waters with the image of a pillared ram's head (Black and Green 1992, p. 16). This motif relates, no doubt, to the god's mythic identification with an aquatic dragon and ibex in the 'watery deep' (*abzu*) of Eridu

(Kramer and Maier 1989:39, 43), and likely bears some relation to the aforementioned image of an aquatic ram that approaches a pillared lotus-tree with serpentine stems (Fig. 5b; see also Frankfort 1989, Fig. 152, 225, 287, 296, 379, 393; Keel and Uehlinger 1998, Fig. 52, 53, 219, 223).

According to another ancient Sumerian myth, the primordial tree of creation, or *huluppu* plant, was first plucked from the waters of the Euphrates River by a close female associate of Enki, namely Inana, Sumeria's most famous goddess of vegetation (Wolkstein and Kramer 1983:4–9). This goddess cultivated her riverine plant in a holy garden so that it might eventually provide her with a throne and a bed. Unfortunately for the Inana, her precious plant was soon inhabited by a serpent in its roots and an *anzu*-bird in its boughs (much as other immortalizing trees of the ancient Orient). Since these symbolic creatures of the Earth and Sky (respectively) proved unwilling to share the use of their home with the gods, Inana was forced to enlist the help of her famous mythic brother, Gilgamesh, to dispossess the serpent and bird of their home. Having accomplished this feat, Inana fashioned a diadem for her brother and a bed for herself out of the roots and trunk of the wondrous plant.

The Sumerians normally recognized Inana as a goddess of the skies and a sister of the sun-god, Utu. Yet she frequently pays a visit to the underworld of her sister, Ereshkigal, in the aquatic domains of Uruk and Eridu (i.e., near Ur and Eden of Sumerian myths; Wolkstein and Kramer 1983:51–91). In this respect her physical attributes and mythic activities seem to mirror the morphic and behavioral characteristics of her cherished plant; for Inana is intimately associated with aquatic environments, a primeval tree of creation, the cyclic occurrence of vegetative life, and ornaments of gold and lapis lazuli (i.e., the natural colors of the Egyptian lotus). She displays her adornments in the heavens and discards them from her body when she descends into the bowels of the Earth (presumably on an annual basis), much as a lotus blossom. Inana was occasionally identified as none other than Ishtar of Babylon and Assyria or as Ashtarte, Ashtoreth, Asherah or Anat of Canaan and Egypt, all of whom share close iconographic relations with the sacred lotus (Fig. 4 c, d; Budge 1969:278–280; Frankfort 1939:207, 278; Keel

and Uehlinger 1998:54, 65, 66, 86, 87, 360; Patai 1990:58–60, Fig. 12–16, 18).

The *huluppu* plant of Inana is possibly the same immortalizing plant that eluded her famous heroic brother, Gilgamesh, whom in the mythical guise of a mortal man sought a sweet-smelling, aquatic flowering plant (Pritchard 1969:73). Various versions of the Gilgamesh story are recorded on tablets of the Akkadians, Sumerians, Hittites, Hurrians, and Assyrians, and all recount the manner in which a crafty serpent succeeds in reclaiming the plant of the gods from this heroic figure before he is able to consume his prized possession (Pritchard 1969:96). As the serpent repossesses his rightful property, he slips out of his worn-out skin to reveal his immortal character to Gilgamesh, thereby signaling that humankind will be denied the gift of eternal life. It is widely acknowledged that this tale shares a common origin with the biblical account of Eden's proverbial tree of life, since both tales incorporate the mythical themes of a sacred tree, devious serpent, human aspirations to live in paradise, and the origin or perpetuation of human mortality. And it is similarly hypothesized that these tales share close relations with the 'Myth of Etana', in which tale a heroic shepherd known as Etana is granted access to a 'tree of rebirth' (the *sammu* plant) by following the helpful advice of a sun-god (Shamash). In this case, the shepherd is able to elude a diabolical serpent at the root of the sacred tree by mounting the back of a divine eagle to reach the upper boughs of the plant (Black and Green 1992:78; Pritchard 1969:114–119). These and yet other related mythical tales probably relate to the iconographic practice of placing a winged solar orb, eagle, or leogryph above or beside the tree of life (Fig. 1a, c, d, e, 2c), and the custom of placing sacred serpents around the tree's solar orb (Fig. 1c, 5c) and pillared trunk (Danthine 1937, Fig. 152; Frankfort 1939:120–122).

THE RETURN OF THE TREE OF LIFE

Various mythic traditions of Europe and Asia maintain that the tree of life will reappear on Earth at some time in the distant future and bestow eternal life upon living creation. Zoroastrians believe that the 'tree of all seeds' (*homa*) will spring from the waters of Lake Hamun of Iran during the Earth's final days of reckoning (*Bundahishn* xxvii.4, xxx.24–25; see West 1880, SBE 5:126; Boyce 1991:125), while Muslims

await a similar plant in paradise on the last day of judgement, when it will take its predestined place at the right hand of Allah in the seventh level of heaven (*Koran* liii, lvi). Rabbinical literature acknowledges that the tree of immortal life resides permanently in Yahweh's garden of paradise (*Jalkut Shimeon*, *Genesis* xx; James 1966:778), whereas Christians anticipate the re-appearance of the same plant in Jerusalem upon the return of Jesus Christ (*Revelations* ii, xxii). While these and related beliefs have long been dismissed as superstitious speculations by biologists, there appears to be an underlying historical significance to these mythic and prophetic scenarios. An objective consideration of the archaeological record suggests that the plant in question is the Egyptian lotus, and that humankind has never lost contact with the famous 'plant of the gods'. What has apparently been lost over the ages is our understanding of the mythic significance of the plant, and the ritualistic role it once played in the religious traditions of our distant forebears.

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THE DELPHIC BEE: BEES AND TOXIC HONEYS AS POINTERS TO PSYCHOACTIVE AND OTHER MEDICINAL PLANTS

JONATHAN OTT

Ott, Jonathan (*Natural Products Co., Apartado Postal 532, Xalapa, Veracruz, México*). THE DELPHIC BEE: BEES AND TOXIC HONEYS AS POINTERS TO PSYCHOACTIVE AND OTHER MEDICINAL PLANTS. *Economic Botany* 52(3):260–266, 1998. Herein a brief review, with 49 references, of the history and phytochemistry of toxic honeys, in which bees have sequestered plant secondary compounds naturally occurring in plant nectars (floral and extrafloral). It is hypothesized that such toxic honeys could have served as pointers to psychoactive and other medicinal plants for human beings exploring novel ecosystems, causing such plants to stand out, even against a background of extreme biodiversity. After reviewing various ethnomedicinal uses of toxic honeys, the author suggests that pre-Columbian Yucatecan Mayans intentionally produced a psychoactive honey from the shamanic inebriant *Turbina corymbosa* as a visionary substrate for manufacture of their ritual *metheglin*, *balché*.

LA ABEJA DÉLFICA: ABEJAS Y MIELES TÓXICAS COMO INDICADORES DE PLANTAS PSICOACTIVAS Y OTRAS PLANTAS MEDICINALES. Se presenta una breve reseña, con 49 citas bibliográficas, de la historia y fitoquímica de mieles tóxicas, en las cuales las abejas han secuestrado compuestos secundarios de plantas, de ocurrencia natural en sus néctares (florales y extraflorales). Se hipotiza que semejantes mieles tóxicas podrían haber funcionado como indicadores hacia plantas psicoactivas y otras plantas medicinales, para seres humanos explorando ecosistemas novedosos, haciendo destacar semejantes plantas, aún contra un trasfondo de biodiversidad extrema. Después de reseñar varios usos etnomedicinales de mieles tóxicas, el autor sugiere que los mayas yucatecos precolombinos produjeron a propósito una miel psicoactiva del embriagante chamánico *Turbina corymbosa* como substrato visionario de su aloja ritual *balché*.

Key Words: *balché*; meads; *Turbina corymbosa*; entheogens; Mayan Indians; *Lonchocarpus violaceus*.

Tradition holds the famous Delphic Oracle was revealed by a swarm of bees, and the Pythia or divinatory priestesses in Delphi's Temple of Apollo were affectionately called 'Delphic Bees', while virgin priestesses of Greek Goddesses like Rhea and Demeter were called *mel-issai*, 'bees'; the hierophants *essenes*, 'king bees'. Great musicians and poets like Pindar were inspired by the Muses, who bestowed the sacred enthusiasm of the *logos*, sending bees to anoint the poets' lips with honey (Ransome 1937). Some hold the vatic revelations of the Pythia were stimulated by inhaling visionary vapors of henbane, *Hyoscyamus niger* L., issuing from a fumarole over which the Delphic Bees were suspended, and into which the plant had been cast (Rätsch 1987). The primordial Eur-

asian entheogenic plant *somalhaoma*, known in the *Vedas* as *amṛta*, the potion of immortality, was called *ambrosia* by the Greeks, and with *nektar*, the other sustenance of the Immortals, was associated with bees and honey (Roscher 1883). This curious lore may represent a sort of mythological fossil, concealing a hitherto overlooked mechanism of drug-discovery. I suggest that immemorial pursuit of wild honey, the only concentrated sweet which occurs naturally, could have led inexorably to the discovery of psychoactive and other toxic honeys, while subsequent observation of bees' foraging habits could easily have led preliterate shaman/pharmacognosists to single out toxic plant species, even against a background of extreme biodiversity, as in Amazonia.

Xenophon's 4th century B.C. *Anabasis* (IV, VII, 20) described psychoactive honey-poisoning during the 'Retreat of the Ten Thousand' in

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the ill-starred expedition of Cyrus. Countless soldiers in the Greek army, encamped near Trebizonde in Asia Minor, ate liberally of honey found there, "lost their senses and vomited," and "resembled drunken persons." Pliny (XXI, XLV) described madness-inducing honey from this area as *meli mænomenon* ('mad honey'), and also mentioned (XXI, XLVI) a medicinal honey from Crete, *miraculum mellis* or 'wondrous honey' (Halliday 1922; Ransome 1937). The 6th–8th century B.C. *Homeric Hymn to Hermes* referred to *melissai* or bee-oracles from Delphi's Mt. Parnassos, who could prophesy only after ingesting *meli chloron* or 'green honey', perhaps a reference to Pliny's 'mad honey'. It was conjectured that these bee-oracles were the Pythia, hence psychotropic honey could have been a catalyst for the mantic utterances of the Delphic Bees (Mayor 1995). It is thought the source of *meli mænomenon* was *Rhododendron ponticum* L., which contains toxic glucosides called andromedotoxins or grayanotoxins (Krause 1926; Plugge 1891; Wood, et al. 1954), found in other species of Ericaceae, notably *Kalmia latifolia* L., another plant whose honey has provoked poisonings (Howes 1949; Jones 1947). Grayanotoxins occur in North American toxic honeys, presumably from *K. latifolia* (Scott, Coldwell, and Wiberg 1971). Frequent honey poisonings in Japan (Kohanawa 1957; Tokuda and Sumita 1925) were traced to ericaceous *Tripetaleia paniculata* Sieb. et Zucc., and grayanotoxins were found in these honeys (Tsuchiya et al. 1977). Another toxic glucoside, ericolin, is known from ericaceous *Ledum palustre* L., and from honeys derived from this plant, which caused human poisonings (Kozlova 1957; Palmer-Jones 1965). Both *L. palustre* and *L. hypoleucum* Kam. are used as shamanic inebriants by Tungusic tribes of Siberia (Brekhman and Sam 1967); while 'Labrador tea', *L. groenlandicum* Oeder of the Kwakiutl Indians is said to have 'narcotic properties' (Turner and Bell 1973). Similarly, the well-known ericaceous *kinnikinnick*, *Arctostaphylos uva-ursi* (L.) Sprenger, is smoked as an inebriant by Kwakiutl and other North American Indians (Ott 1993; Turner and Bell 1973), pointing to possible content of ericolin or grayanotoxins.

An 'epidemic' of honey poisoning in New Zealand was traced to honeydew or excrement of *Scolypopa australis* Walker, which had fed on leaves of *tutu*, *Coriaria arborea* Lindsay, Cori-

ariaceae (Palmer-Jones 1947; Palmer-Jones 1965; Palmer-Jones and White 1949). 'Mellitoxin' isolated from the honey was identical to hyænanchin from euphorbiaceous *Hyænanche globosa* Lamb; and a second honey toxin, tutin, is found in *C. arborea* (Clinch and Turner 1968; Palmer-Jones 1965). This leaf-hopper had transformed tutin from *tutu* leaves into hyænanchin during digestion; the bees making honey from its excrement. Symptoms of this honey poisoning included giddiness, delirium and excitement, suggesting toxicological relationship to the Ecuadorian shamanic inebriant *C. thymifolia* Humb. et Bonpl. ex Willd., *shanshi*, used to induce sensations of flight (Naranjo 1969). Preliminary investigations of *shanshi* suggested presence of a toxic glucoside (Naranjo and Naranjo 1961).

Solanaceae are known both for shamanic inebriants and toxic honeys. Human honey poisonings in Hungary were traced to *Atropa belladonna* L. or *Datura metel* L., and symptoms resembled those of tropane alkaloids scopolamine and hyoscyamine found in both (Hazslinszky 1956). Polish honey poisonings were traced to *D. inoxia* Miller (= *D. meteloides* DC. ex Dunal), and scopolamine found in the honey (Lutowski, Debska and Gorecka 1972). Both scopolamine and atropine were detected in toxic honey from Colombia, of unknown provenience (Barragán de Domínguez 1973). Perhaps *Brugmansia* species were involved—these Andean shamanic inebriants (Ott 1993) yield toxic honeys (Lockwood 1979). Indole alkaloid gelsemine could account for honey poisoning from loganiaceous *Gelsemium sempervirens* (L.) Aiton in 19th century South Carolina—symptoms also included giddiness (Kebler 1896).

Brasilian inebriating honey from stingless bee *Trigona recurva* Smith is called *feiticeira* ('sorceress') or *vamo-nos-embora* ('let's go!')—in "allusion to the reeling, half-drunken condition in which one falls after partaking of this honey" (Ihering 1903[4]). *Mombuca*, Argentine stingless bee (*Melipona* sp.) honey had "inebriating effects owing to the fact that the little bees harvest it from some flowers with narcotic properties" (Spegazzini 1909). Toxic honeys *oreceroch* and *overecepes* occur in Chiquitos, Bolivia; also a delicious honey, *omocayoch*, said to be as inebriating as liquor (D'Orbigny 1839); while a Paraguayan honey was characterized "as intoxicating as aqua vita" (Schwarz 1948).



Fig. 1. Flowers of *Turbina corymbosa* or *xtabentún*, source of the famous Mayan ethnomedicinal honey; Isla Cozumél, Quintana Roo, México.

So at least three categories of psychoactive phytotoxins—indole and tropane alkaloids and glucosides—occur in toxic honeys, and likewise in nectars from which such are made (*vide*: reviews of non-sugar floral-nectar chemistry: Baker 1977; Baker and Baker 1983). Psychoactive cannabinoids occur in pollen of marijuana, cannabinaceous *Cannabis sativa* L. (Paris, Boucher and Cosson 1975). Pollen toxins could be sequestered by bees in honeys, as are nectar or honeydew toxins. *Cannabis* nectar likely also contains cannabinoids, explaining a common belief of marijuana growers, that marijuana honeys are psychotropic.

One of the more recondite Mesoamerican inebriants is the Mayan metheglin *balché*, a mead of stingless-bee honey, water and bark of leguminaceous *balché*, *Lonchocarpus violaceus* (Jacquin) DC. (Gonçalves de Lima, et al. 1977). *L. violaceus* is psychoactive, owing to content of longistylines (Delle Monache, et al. 1977) or piscicidal rotenone, and Mayaist C. Räscht proposed other shamanic inebriants, like psilocybian mushrooms and *ololiuhqui* (*Turbina corymbosa* [L.] Rafinesque, *xtabentún* in Mayan; Fig. 1), were once added to *balché* (Räscht 1992).

Räscht thought feasible my suggestion that *xtabentún* may have been a *balché* ingredient, as honey rich in psychotropic ergoline alkaloids of this Convolvulaceae (Hofmann 1963)—noting the Lacandón Indians, avid *balché* consumers, know of inebriating honeys. Contemporary shamanic use of *T. corymbosa* has not been documented among the Mayans, but is all but universal among indigenous groups in Oaxaca, and occurs elsewhere in México (Lipp 1991; Wasson 1963). Besides psychoactivity, ergolines have potent uterotonic effects, and seeds of *ololiuhqui/xtabentún* are also used as ecbolics/oxytocics (to precipitate childbirth) by indigenous groups in Oaxaca (Browner 1985; Ortiz de Montellano and Browner 1985). ‘Virgin honey’ of stingless bees (*Trigona* sp.) is used in ethnogynecology in Huejutla, Hidalgo (Ramos-Elorduy de Conconi and Pino Moreno 1988), and R.L. Roys documented use of wild stingless-bee honey in Mayan ethnogynecology, noting of *Tabentun* (*xtabentún*, identified as convolvulaceous): “the aromatic honey from its flower is said to be the source of a potent drink” (Roys 1931). Oaxacan Mixe use *T. corymbosa* as a shamanic inebriant, and also employ “special honey” from *Trigona* sp. as an ethnogynecological remedy (Lipp 1991). Clavigero highly praised *estabentún* honey (Clavigero 1780); entomologist H.F. Schwarz attributed *xtabentún* honey to *Melipona beecheii* Bennett, noting it was still produced in Yucatán in the 1940s, being the most esteemed of many ethnomedicinal Mexican honeys (Schwarz 1948). An article on Mayan apiculture described situating hives near natural stands of *xtabentún*, noting “all their honey comes from this flower. No other is allowed to prosper in the immediate vicinity” (Mediz Bolio 1974). These clues suggest *colelcab* (*M. beecheii*) *T. corymbosa* honeys were produced intentionally and much esteemed for constituent ergoline alkaloids conferring uterotonic and psychoactive properties. Such honeys may have been exploited by the Mayans in fabrication of their ritual metheglin *balché*, endowing the sacred inebriant with the plant’s legendary and chemically-verified entheogenic properties.

Field work in Yucatán and Quintana Roo revealed *xtabentún* honey was no longer of economic importance, and traditional Mayan hollow-log apiculture was found sadly degenerated (Fig. 2, 3). We failed to obtain samples of *xtabentún* honey for bioassay and chemical analy-



Fig. 2. Sr. and Sra. Rufino Solís with thatched-roof apiary of hollow-log hives of *colelcab* at Rancho Xbacóc near Espita, Yucatán, México. Photo: J. Ott.

sis, but attempts to produce it are underway. In Mérida and Valladolid, Yucatán, there survives production of a distilled liqueur from fermented honey, and known as *Xtabentún*! A modern liqueur named for a pre-Columbian entheogen, is yet another clue pointing to existence of inebriating *T. corymbosa* honey, and its probable use as traditional fermentation substrate for the sacred Mayan metheglin *balché*.

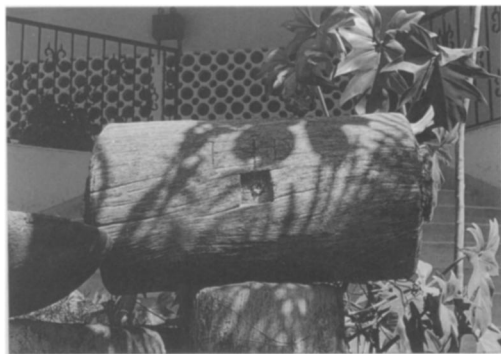


Fig. 3. Typical hollow-log hive of *colelcab* as tourist attraction in courtyard of hotel in Valladolid, Yucatán, México. Photo: J. Ott.

Xtabentún liqueur and conjectured use of psychoactive honey in *balché* have parallels in the classical and modern worlds. Pliny noted *meli mænomenon* of Asia Minor was made into a mead or metheglin, and toxic Ericaceæ honey was traditionally added to alcoholic beverages in the Caucasus, to enhance their inebriating properties; while such toxic honey, *deli bal*, is taken in Turkey as a tonic in milk. *Deli bal* was an important export from this region in the 18th century, widely used to potentiate liquors in Europe—called *miel fou*, ‘crazy honey’ in France (Mayor 1995). “Very intoxicating” honey, likely from *Kalmia* spp. (mountain laurel) was used in 18th century New Jersey to ‘spike’ liquor sold under the appropriate trade-name ‘Metheglin’ (Jones 1947; Kebler 1896).

Toxic honeys are not unusual (I have intentionally ignored the literature on non-psychoactive plant [and industrial] toxins sequestered in honeys), nor are accidental inebriations by psychoactive honeys exceptional. In satisfying the universal human “sweet tooth” during human explorations of any given ecosystems, foragers would encounter psychoactive and other toxic



Fig. 4. Ah-Muzen-Cab, Mayan bee-god, above his pyramid-top temple at Tulum, Quintana Roo, México. Photo: J. Ott.

honey. Having consumed such honeys and experienced psychoactive or other medicinal properties of their contained alkaloids and allied phytochemicals, it would require no special technology nor great imagination to follow the bees to the nectar source, thereby easily finding valuable plants. It has been suggested that ethnomedicinal and culinary plants were discovered by a systematic process of ingesting all species, in the eternal search for food. Some have questioned whether such an extensive bioassay program were feasible in areas of extraordinarily-high biodiversity, such as Amazonia, thought to be home to at least 80 000 species of higher plants (Schultes 1988)! Apart from observation of the effects of bioactive plants on domestic and wild animals, serendipitous encounters with phytotoxins in honeys could have served as highly-specific and efficient pointers to medicinal, especially psychoactive, plants, which would thus stand out in deep relief, even against a backdrop of extreme phytodiversity.

There is evidence that in the case of *T. cor-*

ymbosa among the Yucatecan Mayans, a toxic honey may have attained exalted status as a preferred method of ingesting a psychoactive plant, even being produced intentionally. These Mayans came to worship bee-gods like Ah-Muzen-Cab, 'Great Lord Bee', who can be seen descending even today, above the entrances to pyramid-top temples at Tulum and Cobá, his ancestral home (Fig. 4). Much as we sweeten our bitter medicines with sugary syrups, bees collecting toxic nectars from flowers might naturally have prepared and concentrated a sweetened drug for the delectation of awed human votaries of Ah-Muzen-Cab and his industrious, heavenly host.

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BOOK REVIEW

The Green Pharmacy. James A. Duke. 1997. Rodale Press, Inc., 33 E. Minor St., Emmaus, PA. xvii + 507 pp. (hardcover). \$29.95. ISBN 0-87596-316-1.

Before starting this review, I must confess that I have been a proponent of Jim Duke's since I was a graduate student. At the time he was legendary among students. We considered him the wild man who went into the Panamanian forests of Darien where he stayed collecting plants until his assistants were forced to drag him out when he became delirious with an infection. This book contains more of Duke's personality than any of his others. Those tomes were dry compendia of facts, and encyclopedias dictated by his job at USDA. This book contains Jim Duke on every page; his irreverent humor; his perceptive view of scientists of all kinds; and his empathy with people who do not live in a "First World" country.

This book will likely make some other authors of herbal books jealous and furious. First, Duke has a more open-minded approach to uses and possible uses than some of those books. Jim is not bound hopelessly to clinical research results and understands that every individual reacts differently. Second, those other authors will be angry at the lost income Jim's book will produce when it out-competes theirs.

Green Pharmacy is divided into two parts (three really, because there is an autobiographical postscript at the end). The first part is a guide to the green pharmacy. Here he provides the common-sense rules for using herbal medicines and gives the proper caveats for those who do not think for themselves. Let us hope the warnings are heeded by those looking for a quick

escape from day-to-day tedium. The second part is an alphabetical listing of the herbs that heal (pp. 24–464). These herbs are provided, not by species as most devout biologists would have done, but by the malady. The sequence goes from "Aging" to "Yeast Infections." In between these entries are many others along with the plants that Duke thinks may help. He even provides a ranking system to show those that are probably better than the others.

No one reading this book should expect the plants listed to provide miracle cures. They will *not* be equivalent to the impacts of penicillin or its successors. Still, the compounds the plants contain have been used for millennia by people around the world who recognized their value and effectiveness. No one with a stomach ulcer, for example, should expect ginger, licorice, banana, cabbage, calendula, garlic or the other eight species listed to cure them. Instead, these are plant that, when used as Duke suggests, will aid the problems associated with the disorder—in many individuals. Repeatedly, Duke demands that individuals should consult their physicians about using these plants.

I have not enjoyed one of Duke's books this much since I first read his narrowly known *Lewd Latin Lexicon* back in the 1960s. Nor have I read another book on herbal medicines in the past couple decades that was as clear-minded and instructive as this one. For all interested in plants and medicines, this book is a "must-read" item.

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A Note on Medea's Plant and the Mandrake

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A Note on Medea's Plant and the Mandrake¹

RAYMOND J. CLARK

πρωτοφύες τόγ' ἀνέσχε καταστάξαντος ἔραζε 851
αἰετοῦ ὠμηστέω κνημοῖς ἐνὶ Καυκασίοισιν
αἱματόεντ' ἰχῶρα Προμηθῆος μογεροῖο.
τοῦ δ' ἦτοι ἄνθος μὲν ὅσον πήχυιον ὑπερθεν 855
χροιῇ Κωρυκίῳ ἵκελον κρόκῳ ἐξεφάνθη,
καυλοῖσιν διδύμοισιν ἐπήγορον· ἡ δ' ἐνὶ γαίῃ
σαρκὶ νεοτμήτῳ ἐναλγική ἔπλετο ρίζα.
τῆς οἶν τ' ἐν ὄρεσσι κελαινὴν ἱκμάδα φηγοῦ
Κασπίῃ ἐν κόχλῳ ἀμήσατο φαρμάσσεσθαι,
ἐπτὰ μὲν ἀενάοισι λοεσσαμένη ὑδάτεσσιν, 860
ἐπτὰ δὲ Βριμῷ κουροτρόφον ἀγκαλέσασα,
Βριμῷ νυκτιπόλον, χθονίην, ἐνέροισιν ἀνασσαν,
λυγαίῃ ἐνὶ νυκτί, σὺν ὄρφναίοις φαρέεσσιν.
μυκηθμῷ δ' ὑπένερθεν ἐρεμνὴ σείετο γαῖα,
ρίζης τεμνομένης Τιτηνίδος· ἔστνε δ' αὐτὸς 865
Ἰαπετοῖο πάϊς ὀδύνῃ περὶ θυμὸν ἀλύνων.

(*Argon.* III, 851-66²)

APOLLONIUS RHODIUS in his *Argonautica* does not call Medea's plant a mandrake, nor does Steier in his long article 'Madrageoras' in Pauly Wissowa, *Real-Encyclopädie*³ or Frazer in his lengthy treatment of the mandrake in *Folk-Lore in the Old Testament*⁴ connect the two plants, but the connection is clearly present in both nature and folklore.

¹ I wish to thank Mr H. W. Stubbs, of the University of Exeter, for first drawing my attention to this topic.

² 'This came forth first born when the flesh-eating eagle let drip to earth on the slopes of Caucasus the blood-like ichor of suffering Prometheus. Its flower coloured like a Corycian crocus appeared a cubit's height above ground, born on twin stalks, while its root resembled newly-cut flesh in the earth. Its dark juice, like that of mountain-oak, she had gathered in a Caspian shell for her magic after first bathing in seven ever-flowing streams and calling seven times in the murky night, clad in dusky garments, on Brimo who is nurse of children, night-wandering Brimo of the world below, queen of the departed. The dark earth beneath quaked and groaned as the Titanian root was severed, and the son of Iapetus himself groaned in agonizing heartfelt pain.'

³ Vol. XIV, 1028-37.

⁴ London, 1918, II, 372-97.

(1) The mandrake is difficult to obtain and correct ritual is essential.⁵ Medea's plant, called the 'herb of Prometheus', *φάρμακον Προμήθειον*, is difficult to obtain also and Medea observed correct time, lustrations, dress and prayers in order to procure it.

(2) Medea's plant, which caused the earth to groan as she tore out the roots (864-5), shares this motif with the later folklore tradition of the mandrake. Shakespeare wrote in *Romeo and Juliet*, IV, 3:

And shrieks like mandrakes torn out of the earth
That living mortals, hearing them, run mad.

The plant shrieked because it was living flesh; Apollonius says that Prometheus himself groaned in agony (865-6).

(3) Both Medea's plant and the mandrake of the middle ages spring from the vital juices of an innocent man. Johann Schmidel in his *Dissertatio de Mandragora*⁶ gives this interesting account:

Ex urina quam homo innocenter ad suspensum furci crimine damnatus inter extrema vitae effuderit, herbam nasci aiunt sub patibulo, foliis latis, flore croceo, radice hominem examussim simulante, pilis quoque et ipsis sexuum notis apparentibus. Nonnulli adiciunt, vitalem fuisse subterraneum hunc foetum.⁷

Thus the mandrake not only shrieks but springs from the urine of an innocent man unjustly condemned for theft. Once again the motif of the mandrake is anticipated by Apollonius who tells us that Medea's plant sprang from the blood of Prometheus,⁸ and Prometheus too was an innocent (from the human viewpoint at

⁵ See Theophrastus, *Historia Plantarum*, IX. viii. 8 and Pliny, *Naturalis Historia*, XXV 148.

⁶ Lipsiae, 1671, section 53.

⁷ 'From the urine which a man exudes in the last moments of life when unjustly hanged for theft, it is said that a plant is born — beneath the gallows — with broad leaves and the flower of a crocus. It has a root which exactly resembles a man, even hairs and sexual features are to be found. Some say that this plant was alive underground.'

⁸ Cf. Seneca, *Medea*, 708-9; Propertius I. xii. 9-10; Valerius Flaccus, *Argonautica*, VII. 355-60; Ausonius, *Technopaegnion*, X. 10-11. The tradition that Medea's plant sprang from the blood of Prometheus may have affected the tradition of the Moly plant as recorded by Eustathius (*ad Homeri Odysseam*, 1658, 47 f.) who says that according to the mythologist Alexander of Paphos Moly originated from the blood of Pikoloos, a Giant slain by Helios: *καὶ τοῦ αἵματος ἐνέοντος εἰς γῆν φῶναι βοτάνην, καὶ κληθῆναι αὐτὴν μῶλυ διὰ τὸν μῶλον ἦτοι πόλεμον ἐν ᾧ ἔπεσεν ὁ ῥήθεις Γίγας.*

least) who was unjustly condemned as a thief. Urine in the later tradition replaced blood since death by hanging did not involve bloodshed. Both versions may derive ultimately from an original where the plant grew from semen; seed possess generative powers which urine certainly does not, and such seed will account for the human likeness of the plant. An associated motif which has been pushed into the Creation myth is to be found in the story told in Hesiod's *Theogony* (167–201) of how Aphrodite rose from the severed testicles of Ouranos when they were dropped into the sea, while from his fallen blood sprang the Furies, Giants and Melian nymphs.⁹

(4) Schmidel in the above passage also recorded the detail that the mandrake has the flower of a crocus, and this again recalls Apollonius Rhodius who likens Medea's plant to a Corycian crocus (855).¹⁰ Robert Graves remarks that 'Medea's Colchian crocus is the poisonous *colchicum*, or meadow-saffron, used by the ancients as the most reliable specific against gout'.¹¹ If Graves' identification is correct the colour is pale rosy-purple rather than

⁹ Rendel Harris actually thought that Aphrodite developed from the mandrake and says: 'Aphrodite is a personification of the mandrake or love-apple' (*The Ascent of Olympus*, 134; cf. 107 ff.). He cites the lexicographer Hesychius who named Zeus and Aphrodite under *Μανδραγόρας* and *Μανδραγορίτις* respectively, but overlooks the connection mentioned in the text. Compare also the Hindu goddess of love and beauty, Lakshmi, who was born from the churning Ocean riding on a lotus, and the Hittite goddess of love who was born from the castrated member of the sky-god Anu.

That 'seed from a serpent's jaws' will beget earthborn men complete with bronzen armour (Apollonius, *Argonautica*, III. 498–9) was doubtless taken over from the foundation ritual in the Cadmus story (for references see Frazer on Apollodorus, *Bibliotheca*, III. iv. 1), though it again recalls the Hesiodic *Theogony* where the Furies and Giants sprang from the blood of Ouranos complete with armour and spears (183–7: on these lines see M. L. West's recent commentary). The incident with the men born from dragon-seed makes an interesting variation to the story, but plays no integral part besides providing an additional ordeal for Jason; it is missing in the earlier Pindaric version (see *Pythian Odes*, IV. 224–46).

Apollonius thus named the plant 'the herb of *Prometheus*' aptly. Prometheus had not been castrated nor had he sprung from spilt blood. But he was a Titan and drops of his blood were readily available in the Caucasus locality. Any plant springing from the vital juices of a supernatural person may be expected to have supernatural powers.

¹⁰ It is surely significant that Jason wears a saffron garment according to Pindar, *Pythian Odes*, IV. 232–3. What seems strange is that Jason should cast off this *κρόκεον/κροκόεν εἶμα* just before the fray, whereas according to Apollonius (III. 854–5) Jason smears on juices culled from the saffron plant in order to form a magical protection against the flames of Aetes' bulls and the stroke of bronze.

¹¹ *Greek Myths*, II, 240.

yellow, as is often thought. The crocus of the Corycian cave in Cilicia (renowned in Strabo, Pliny and Horace)¹² is also said to have sprung from blood;¹³ and similar stories are grouped by Ovid.¹⁴ Such legends may originate in the East where the anemone got its colour red from the blood shed by the torn feet of the goddess in search of Adonis.¹⁵ The mandrake has yellow apples and purple flowers according to Robert Graves and R. Patai in their commentary on Genesis, xxx, 14-16.¹⁶

(5) There is a further tradition, also recorded by Schmidel in the passage quoted above, that the mandrake root has human form with shoots resembling the human genitalia.¹⁷ These features doubtless explain why the mandrake was used as an aphrodisiac. That this custom was known to the East in ancient times is attested by Genesis, xxx, 14-16 and Canticles, VII, 10-13, if we can trust the Septuagint translation which renders Hebrew *dúdd'im* by *μανδραγόραι* or *μηλα μανδραγορων*. A vestige of this custom may be present in Apollonius' account. Ostensibly Medea gave Jason the magic juice of the plant to help him obtain the Golden Fleece. But Medea's prominent, though secondary, desire for Jason as lover and husband¹⁸ is relevant in connection with the mandrake's known aphrodisiacal powers. The precise botanical — as distinct from folklorist — identification of Medea's plant with the mandrake is of little importance since poets are often notoriously bad botanists. One feature of the plant is remarkable however and invalidates Graves' straight identification with *colchicum*. The flower is 'born on twin stalks' (856). If *καυλός* means a stalk above ground, as it means elsewhere (antiquity could not agree as to whether the mandrake had a stem or not)¹⁹ it looks as though Apollonius may have misunderstood tradition and regarded the stalk, rather than the root, as forked. Nevertheless

¹² Strabo, *Geography*, 670; Pliny, *Naturalis Historia*, XXI, 31; Horace, *Satires*, II, iv, 68.

¹³ See especially Galen, ed. Kühn, *Medicorum Graecorum Opera*, XIII, p. 269.

¹⁴ *Fasti*, V, 223-9.

¹⁵ T. H. Gaster, 'Some Ancient Oriental Folklore', *F.L.* 49 (1938), pp. 343-4.

¹⁶ *Hebrew Myths*, 219-20.

¹⁷ Readers may judge for themselves the truth of these resemblances from illustrations of male and female mandrakes which are reproduced by R. Harris, *op. cit.* facing pp. 107-15.

¹⁸ Cf. Pindar, *Pythian Odes*, IV, 220-3.

¹⁹ Cf. Pliny, *Naturalis Historia*, XXV, 147-50 with Dioscurides, ed. Kühn, *Medicorum Graecorum Opera*, XXV, p. 570.

as the ensuing passage makes clear, the importance of the root is uppermost in the poet's mind. We may note in passing that Medea carefully tended the plant. Mandrakes were kept as fetishes or talismans in the East, but the habit might independently arise quite naturally. The present writer recalls an instance where a forked parsnip was presented to a honeymoon couple, although neither givers nor receivers admitted acquaintance with the folk lore tradition of the mandrake.

(6) Whoever tears up the mandrake must die, and frequently a dog is therefore made to tear up the root by attachment to its body. C. B. Randolph in his invaluable article 'The Mandragora of the Ancients in Folk-lore and Medicine'²⁰ expresses his belief that many features of the later mandrake superstition — including some already mentioned — were transferred to it from other plants. The dog motif he traces to Josephus' tale about *baaras*²¹ and to Aelian's story about *cynospastus* or *aglaophotis*.²² Since Josephus' plant is named after Baaras near the Dead Sea and Pliny says that *aglaophotis* grows in eastern Arabia,²³ Randolph believes that this motif is to be traced to the East. Frazer²⁴ notes that according to Jewish tradition the mandrake is procured by tying the root to an ass, and thinks that the writer of Genesis may have known but suppressed this detail. If so Randolph's conjecture is confirmed and the motif is earlier than Aelian, Josephus, or even Apollonius Rhodius. No such motif is narrated in Apollonius' account. He does say that Medea was fawned upon by 'whining' beasts who trembled before her as she journeyed to give Jason the magic drug (883-4); it is possible that Apollonius knew the dog motif but suppressed it thus. That Apollonius did not say that the root was pulled out by a dog matters little because Medea, although human, has supernatural gifts and takes supernatural precautions which form an adequate prophylactic to protect her from the dangers.

²⁰ *Proc. Amer. Acad. of Arts and Sci.*, 40 (1905), 485-537.

²¹ *Bellum Judaicum*, VII, 6, 3.

²² *De Natura Animalium*, XIV, 27.

²³ *Naturalis Historia*, XXIV, 160.

²⁴ *Folk-Lore in the Old Testament*, II, 393.



On the Sacred Names of Iamos and Ion: Ethnobotanical Referents in the Hero's Parentage

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ON THE SACRED NAMES OF IAMOS AND ION:
ETHNOBOTANICAL REFERENTS IN THE HERO'S PARENTAGE

The birth of a miraculous infant is the subject of the narrative in an ode which Pindar composed to celebrate the victory of his patron in a competition of mule teams at the religious sanctuary of Olympia. The patron was the prophet Hagesias and the infant was Iamos, an ancestor of Hagesias and the first in a continuous family line of prophets. The description of the birth is extraordinary, for the poet puns upon the name of Iamos to suggest the infant's transubstantial existence with a toxic plant which is apparently to be the source of his inspiration and the parentage for the child aligns him with divine forces at either end of a vertical plane which transects the sacred place of his parturition. Iamos has a double orientation toward antithetically placed divine powers because, as a prophet, he is to have a double source of mystical vision. I should like to describe the significant elements in the poet's narration because this ode, the *Sixth Olympian*, offers the clearest evidence for the ethnobotanical lore surrounding the paradigmatic birth of a hero and documents the probable etymology, at least in the viewpoint of an ancient poet, for a name like that of Iamos with the stem *iao-* or *io-*, which designates "poison" or "drug." Other similar names may have been understood at times to have had the same derivation. Iason, for example, was the mate of the herbalist and witch Medeia and he was raised by the same centaur who taught the young Asklepios the knowledge of drugs which made him a doctor or *iatros*. Iason's name is apparently a masculine version of Iaso, the goddess of healing. We cannot know, however, how universally a name's meaning would have been sensed except in those instances where a poet specifically directs attention to an etymology, whether scientifically correct or not.¹ In the *Ion*,

¹Sophokles, for example, seems to have punned upon an etymology for the name of Iole in his *Trachiniae*, associating her and Deianeira with a botanic form of *ios* which functions as a love charm that was nourished by an *aiolos* serpent and given birth by the *aiole* night: in their competition for the love of Herakles, both women are flowers, differing only in that Iole, who is younger, is the one to be picked, while Deianeira is the one to be crushed under foot (547-9); Deianeira, in fact, complains that her married life is like being plowed and harvested (32-3) and tells the chorus of maidens that they are meadows which have not felt the terrible heat of the sun which will cause their maidenhood to grow into the experience of maternity (141 ff.); Iole is a love charm (354 ff.), while Deianeira's charm, now that she is no longer young, is the untried potion which she was charmed into receiving from the centaur long ago (710); the pattern for the love embrace is established in the *parodos*, where the *aiole* night (94) and the sun engage in an eternal romance in which each of the lovers can come together only

Euripides offers an etymology for his hero's name from the participle of the verb *ienai*, *ion* or "going," but the entire naming episode in the play is a burlesque of misunderstandings and the poet seems to have structured the narrative of the tragedy to hint at a meaning which would be more appropriate to Ion's sacred nature, for the mystery of his identity derives from a birth which is similar to that of Iamos. The tragedy offers two variant, although analogous, versions of Ion's birth and presents a comedy of mistaken identities which culminates in an initiatory repetition of the birth trauma and the resultant mediation of the Apolline and Dionysian elements in his begetting.

* * *

The mother of Iamos was a certain Euadne, a "flower girl," as her name implies. She was a daughter of Poseidon and of a woman who was identical with an area of land along the Eurotas River in the Peloponnesos. The woman's name was Pitane and she had concealed her pregnancy until the time for her delivery and then had given the unwanted infant immediately away to a foster father. Euadne thus grew up in the court of this foster father, who was a son of Elatos, the "fir tree"; his name was Aipytos, an epithet which was descriptive of his extraordinary height. His kingdom bordered another river of the Peloponnesos and Euadne, like her mother Pitane, thus lived beside a river. In her turn, she, too, conceived a child whose birth she attempted to conceal. Euadne's father was the chthonic deity Poseidon; her own mate is the god Apollo, who is predominantly associated with the opposite realm. Her guardian Aipytos suspected that she was pregnant and accordingly travelled to Delphi to make inquiry of Apollo. While he is there conferring with the divine father, Euadne brings her son to birth.

The act is a "labor of love" (*ὑπ' ὠδινός τ' ἐπαράς* 43). Euadne's travail seems to repeat the ecstasy of the child's conception. She has removed her woven crimson waist band and laid aside the silver pitcher with which she apparently has been drawing water from the river; the child slips effortlessly out of the womb into the light of life. The goddess of swift travail and the guardians of Destiny attend her upon Apollo's

at the moment of the other's annihilation; after Deianeira sends her love charm to Herakles, the night's *ios* which the *aiolos* serpent nourished clings fatally to Herakles' annoyed sides (831-4); the play ends with Iole's transfer from the dying Herakles to his son because only a son can lie beside the father's woman, an idea which had been introduced by Hyllos' having just lain beside his dead mother. The pattern of the sacred marriage, which was enacted in maenadic rituals, underlies the nature of Herakles' love affairs with the two women and, as I shall attempt to explain in this essay, would have been readily recognized by the poet's audience at the Dionysian drama festival. This essay, however, will limit itself to the female's marriage and the procreation of her divine child. The male's mad ecstasy, as in the *Trachiniai*, is a related pattern, which I have described in another essay, entitled "Maiden and Mother: On the Choral Persona of the *Trachiniai* of Sophokles."

command. Like her own mother, however, she, too, deserts her baby, leaving him lying on the bare ground. The place is a briary thicket and the infant lies there "hidden" (54) as if for a second gestation like the fetus of the two "concealed" (31, 36) pregnancies while Apollo announces to Aipytos at Delphi that the child is to be a prophet. For five days he remains there, surrounded by rushes and an impenetrable thicket of briars; his body is drenched in the reflected radiance of "violets" or *ia*, a profusion of flowers which span the color spectrum from red to all the shades of purple (ἱὼν ξανθαῖσι καὶ παμπορφύροις ἀκτῖσι βεβρεγμένος ἄβρὸν σῶμα 55-6). His flowery mother Euadne had been described, herself, earlier as "violet-tressed," *ioplokos* (30), and apparently the sight of the infant amidst the *ion* flowers suggests to her the child's "immortal name," Iamos (56-7).

This scene with the infant drenched in the magical colors is described twice in the ode, on either side of the consultation at Delphi, which is the narrative event which occupies the central position in the ode's system of concentrically arranged themes.² I have just mentioned the naming episode, but actually the name of Iamos does not occur in this second treatment of the episode. The poet records it instead in the first treatment, where the parturition scene is detailed. The place for Euadne's travail is called a "bluish-purple lying-in" (λόχμας ὑπὸ κυανέας 40). It is obviously the same thicket of *ion* flowers. In that place, the abandoned child has received praeternatural nourishment in his mother's absence. By divine plan, two serpents have fed the infant, transferring poison or toxin (*ios*) from themselves to him, but a poison which is beneficial rather than harmful; it is with honey, the venom of bees, that they feed him. Such honey often was said to have nourished poets in their infancy as a sign of their future inspiration and it is perhaps also significant that the priestess of Apollo at Delphi could be called the "Bee." The ambivalent *ios* in the midst of the red-purple *ion* flowers is the sign of the child's divine role as a prophet; both are the etymology for his name. He is Iamos, the man of the *iama* or "drug," and apparently marked with a transubstantial existence with the *ion* flowers and the *ios* which they contain. In ancient herbal lore, serpents and medicinal or toxic plants acquired their drugs interchangeably from each other.³ The drug, furthermore, is the divine spirit which has become incarnate in the plant; and the miraculous child, therefore, also has within himself a portion of that same divinity. Iamos' father, as the Delphic priestess

²I discuss this ode's concentric design in my "Marginalia Pindarica II: The Poet's Grandmother," *Hermes* 96 (April, 1968) 132-42.

³Ver., *Aen.* 2.471: *coluber mala gramina pastus*. It was considered dangerous to pick mushrooms unless the serpent had begun its hibernation: cf. Plin., *H. N.* 95; Nic., *Alex.* 521 ff. The serpent's affinities to fungi and toxic plants are discussed in John Allegro's *The Sacred Mushroom and the Cross* (Garden City, N.Y., 1970) 79-80.

announces in the middle of the naming episode, is Apollo, the god whose "arrows" (*ios*) dispense the poison of disease and who was the divine father of another miraculous child, the prototypic *iatros* Asklepios; Elatos, the "fir tree man," was Asklepios' mortal father and his mother was the "crow woman" Koronis. She seems to have been destroyed on a mountain in the midst of other women, while the fetus was still within her body: like Elatos, the group of women also was apparently somewhat arboreal and all of them were consumed by the fire which leapt from the single seed which had impregnated the mother (Pi., P 3.34-7). Asklepios, like Dionysos, was rescued by his divine father from the womb of his incinerated mother. Not only is the nature of Koronis' conception and death suggestive of the ecstatic experiences of Semele and her maenadic sisters, but one of Koronis' relatives also was associated with toxins and herbal lore. She was a sister of Ixion, who hallucinated that he was sleeping with Hera at a banquet with the gods and thereby fathered the whole race of centaurs (. . . *μαιομένας φρασίν* 'Ἡρας ὅτ' ἐράσσατο. . . Pi., P. 2.25 ff.). His subsequent punishment on the whirling wheel could be interpreted as a destructive intoxication which was caused by his particular plant, *hippomanes* or "horse-mad," the psychotropic *Datura*.⁴ It was apparently this same plant which was responsible for Aias' similarly destructive madness in Sophokles' tragedy: Aias was presented onstage carrying a whip (hypoth. 9-10) which is identified as a "great horse-binding rein" (241-2) and he has been "harvesting" (239) in the "meadow of horse-mad" (143-4, cf. 233).

It seems improbable that the magical *ion* flowers which surround the Iamos child could have been simply the *Viola odorata* or violet. Their association with serpents in Pindar's account suggests instead some psychotropic plant and the *ion*, itself, may have been employed merely for the purpose of the pun which it afforded with *ios* and the etymological derivation of the name of Iamos. The repeated emphasis upon the plant's color, however, may be intended to hint at the identity of a particular psychotropic plant which could not be named openly without transgressing the taboo which reserved it for sacral purposes. The range of color from yellow to violet, which is a detail that Pindar insists upon, corresponds exactly to that of the *Amanitae* mushrooms, amongst which the tawny *muscaria* or fly agaric is both psychotropic and known to have been used for religious ceremonies.⁵ Other members of the same family

⁴Ixion is shown with the *Datura* on a bronze Etruscan mirror of the 3rd or 4th century, B.C., in the British Museum. The juxtaposition of Ixion, bound to his wheel, and the *Datura*, which is shaped analogously to the wheel, is probably meant to represent the hero as a shaman in mystical flight. The wheel and the horse are both indications of the shaman's means of transport; Ixion's association with the wheel as well as with the centaurs and the "horse-mad" plant is probably to be understood in such an ethnobotanical religious context.

⁵R. Gordon Wasson, *Soma, Divine Mushroom of Immortality* (New York 1972) 215.

of mushrooms are fatally toxic and the taboo against the profane use of the *muscaria* was intensified, in other cultures at least, by the intentional confusion of it with poisonous varieties. There is no evidence for such a taboo in ancient Greece although something of the kind might be involved in the obscurity about the actual nature of Iambe's jest at the Eleusinian initiation (Hom., *h. Cer.* 200-5): she seems to have revealed her hermaphroditism by displaying Iakchos growing in her womb (Orph., *Fr.* 52).⁶ That mushrooms, however, did figure in Greek ethno-

⁶It is, of course, extremely hazardous to base an argument on evidence *ex silentio*. In what I add here, I do not intend to imply that I have revealed the Mystery. I should like merely to offer some observations which seem relevant to what may have been involved in some way in certain aspects of the Eleusinian initiation, which, as is generally known, lay under an injunction of silence. It is the nature of religious or mystical experience to reconcile various of the dichotomies of human existence; the figure of Iambe seems to mediate the basic oppositions which form the structure of the myths about Demeter and Kore. The rape of the daughter by a male destroys the maiden and separates her from the mother, while the eternal return from death reunites mother and daughter and involves the birth of a male child; in a metaphysical context of a love enacted between two realms, the maiden's death in her maiden state is the rite of passage to her rebirth in motherhood. Iambe's jest seems to be a pivotal point within this system as the maiden converts to mother and the mother, with the false name of *Doso*, the "Giver," changes into the crone, the nurse of another woman's child. Iambe was also called Baubo and she is represented in fifth-century figurines as a "belly girl," a dwarf with her face in her stomach, as would be appropriate to the etymology of her name from "entrails." Another possible connotation for her name, however, associates her with the *baubon* or "dildo." As womb and phallos together, Iambe was hermaphroditic (cf. Marie Delcourt, *Hermaphrodite* [London 1961; French edition, 1956] 31); the Baubo figurines, in fact, could be interpreted as phalloi which have been decorated as females by the addition of a face and genitalia beneath the glans. In her, therefore, the opposition of male and female are mediated. A further mediation equates the male lover and the procreated male child, the destroyer and the savior, for *bauban* means to "sleep" and it was some kind of sleep in the form of the *narkissos* plant which united Persephone with Hades. Iambe's revelation of the little Iakchos in her womb nullifies the maiden's antagonism toward the lover who has destroyed her maiden identity by converting him into the male child who redeems her from Hades by his own conception. As this essay will attempt to show, both the child and the lover exist on an ethnobotanical level as ritualized attitudes in the gathering of sacred plants by ecstatic women enacting the sacred marriage. Iakchos and Iambe, therefore, may mask further puns upon the *iao*-root.

That some form of psychotropic intoxication was induced during the mystery initiation is now generally admitted (C. Kerenyi, *Eleusis: Archetypal Image of Mother and Daughter* [New York 1967; German edition, 1962] 177-80), although the identification of *blechon* with *Mentha Pulegium* can not be taken as certain in view of the Eleusinian religion's great antiquity and the tendency for plants to change their names in the course of time. *Blechon*, in any case, had aphrodisiac connotations in the fifth century (cf. *blechon* as an aphrodisiac potion: Ar., *Pax* 709-12; and *blechon* as female public hair: Ar., *Lys.* 87-9); it is, however, possible that these psychotropic qualities existed only symbolically because of the sexuality involved in the myths of the two goddesses. The profanation of the mysteries during the fifth century in several private homes might suggest that

botany is proven by a myth about the foundation of Mycenae: Perseus is said to have quenched his thirst at a spring which flowed from a mushroom which he picked at the site of the future city, which was supposedly named after the plant or *mykes* (Paus. 2.16.3). The fifth-century tragedian Aristias seems to have used that tradition in his *Perseus* play (Nauck, *TGF* p. 727). The Gorgon episode of the Perseus myth also could apparently be interpreted in terms of mushroom lore: a fourth-century Italian vase painting shows Perseus decapitating the Medousa at a fruit-laden tree with which she, and in particular her head, is associated; the fruit of the tree is equated with a mushroom, as is indicated by the mushrooms which the artist placed as annotations above Perseus' head.⁷ The foundation myth of another city also seems to have involved fungi, for at Corinth the primal autochthonous inhabitants, according to the eighth-century epic poet Eumelos, were men whom Sisyphos had created out of mushrooms (*ap.* Paus. 2.3.8). Euripides may have recalled the tradition in his *Medeia* (1380-1). Such myths about the primal peoples, like that of Kadmos who sowed the serpent's teeth at Thebes, attempt to reconcile the dichotomy between supernal or foreign origin and the chthonic origin of the earlier peoples who grew like plants from the earth itself. Along with the psychological and historical determinants which seem to have been operative in the creation of the heroic paradigm must also be recognized certain aspects of botanical symbolism in details such as the single-footed stance of figures like Iason and Oidipous, who leave the mountainous locales of their childhood, overcoming their plant-like attachment to place in order to wander and return from abroad. That some Greek mushrooms were indeed recognized for their psychotropic properties can, furthermore, be attested from the fourth-century comedian Antiphanes, who expected his audience to know that a particular mushroom which is associated with the oak tree would presumably induce clairvoyance (Edmonds, *FAC* 227). In addition to the color of the scene for Iamos' parturition, the recurrent emphasis upon the fir tree in the names of Elatos and Aipyros also suggests that it may have been the *muscaria* that was the botanic analogue for the magical infant since the *Amanitae* grow only in mycorrhizal dependence upon the root structures of the birch, fir, and pine trees, which accordingly have figured in the symbolism of the herbalist procedures for finding and

some aspect of the religious experience could be perverted for a social entertainment; such a perversion is appropriate to the profane use of some sacred intoxicant. I doubt, however, that the tabooed item was actually *blechon*; more probably, the taboo hid the identity of whatever was referred to as the *narkissos*.

⁷The vase is catalogued as no. 335 in A. D. Trendall, *The Red-Figured Vases of Lucania, Campania, and Sicily* (Oxford 1967). The author describes the vase simply as "Perseus and the three Gorgons beneath a fruit tree" and makes no note of the two mushrooms. There are, however, four women and not three beneath the tree, although one of them has lost her head, and the mushrooms are unmistakable, even to the indications of grass growing at the bases of their stipes.

gathering the plants and for achieving alteration of consciousness. Despite these suggestions, however, a conclusive identification of Iamos' *ion* is not possible, especially since magical attributes in herbal lore tend to be displaced to plants which in actuality do not possess them but were in some way associated with the original.

Euadne's divine conception and parturition of Iamos has as its prototype herbalist procedures which can be documented from Greek art and literature. Plant-gathering rituals which apparently induced some kind of visionary experience are depicted on signet rings from the Mycenaean-Minoan period. One from grave circle A at Mycenae, which is now in the National Archaeological Museum of Athens (Inv. Nr. 992), shows women who are presenting flowers to a woman seated beneath a tree, while the apparition of a male in a body shield hovers in the sky as the seventh item in a sequence of six ascending bucrania. Another from Isopata, which is now in the Herakleion Museum, depicts women in a flowering place with the apparition of a goddess in the sky, to whom has been added the annotation of a single eye. These rituals provide referents for myths like that of Persephone, who met her lover from Hades when she picked the *narkissos* flower (Hom., *h. Cer.*). The flower was apparently some psychotropic plant whose name, according to Plutarch, was supposedly derived from *narke* or "numbness" (2.647b). Eurydike, also, was taken to Hades when she was bitten by a serpent as she picked flowers. According to Euripides, Helen, too, was picking flowers when she was transported through the air to a tomb in Egypt (*Hel.* 240-51), which is the land from which she was supposed to have derived her great knowledge of drugs (Hom., *Od.* 4.221 ff.). That such confrontations with a spiritual lover do indeed occur in a context of ritual plant-gathering is verified by the rationalized version of the myth of the rape of Oreithyia which Plato presents in the *Phaidros* (229c ff.): instead of being raped by Boreas, she was merely playing with her friend Pharmakeia or the "use of drugs" when she fell off the mountain, pushed by a gust of wind.

It is probable that maenadic rites involved such gathering of plants, which were used as psychotropic additives to the sacred wine, for ancient wine customarily had its intoxicating properties intensified by the addition of herbal toxins.⁸ This fact is generally acknowledged by students of ancient technology, but its implications for Dionysian symbolism, which must accordingly involve more than the vine, have not been noted. The art of distillation was unknown before late Hellenistic antiquity and ancient Greek wine, which inevitably tasted of pitch from the containers in which it was stored (Ar., *Ach.* 190), never attained an alcoholic content beyond that produced by simple fermentation. The Greeks,

⁸On the nature of Greek wine and the rituals of plant gathering, I am summarizing here material from a work in progress in which I study the Dionysian drama festivals and the ethnobotanical symbolism of the god Dionysos.

nevertheless, customarily drank their wine diluted with three or four parts water. The potency of such diluted wine, on the evidence of the comedian Euboulos, was strong enough to induce a severe intoxication after only four cups and a complete derangement after ten (Edmonds, *FAC* 19). The drinking of undiluted wine was thought to induce permanent insanity (Hdt. 6.755-84; Ath. 10.436) or death (Ath. 10.437); and some wines were so strong that they could not be drunk safely without dilution with so much as eight parts water (Plin., *H. N.* 14.53). Not only does the absence of techniques for distillation make it impossible that the intoxicant in such potent wines could have been alcohol alone, but evidence can be found to document the fact that different ancient wines could induce diametrically opposed alterations in consciousness (Thphr., *HP* 9.18.10; Ath. 1.31; Plin., *H. N.* 14.117; Ael., *VH* 13.6). The *thyrsos* which maenadic women carried indicates that they were probably engaged in the activity of gathering plants in which the god Dionysos was thought to be immanent. Plant-gatherers used to stuff their herbs into reeds and fennel-like stalks in order to preserve their freshness (Thphr., *HP* 9.16.2); the *thyrsos* was such a stalk into which ivy leaves have been stuffed and ivy was recognized in antiquity for its psychotropic properties (Dsc., *Alex.* 2.179; cf. Plin., *H. N.* 24.75). That there were indeed elaborate rituals for gathering magical plants in ancient Greece can be documented (Thphr., *HP* 9.8.6; cf. Plin., *H. N.* 25.29; Ael., *VH* 9.32) and, although our literary sources would ordinarily have had little cause for recording these folk traditions, Sophokles must have incorporated some authentic details of herbal lore in his lost *Root-Diggers* or *Rhizotomoi* tragedy, in which the chorus was apparently composed of herbalist witches. The female's religious associations with earth in Greek culture would suggest that the plant which grew from the ground would in some way be fantasized as her child as well as the child of earth. The transition of the plant-child to the role of plant as lover would, moreover, be inevitable since the ingested toxin would induce the ecstasy which was interpreted, through sexual metaphors, as communion with the deity. We may get some pictorial confirmation for these assumptions from a fourth-century red-figured pelike in the British Museum.⁹ It depicts a woman who holds a rectangular box from which she sprinkles flour or seeds of some kind above a garden of phallos to recompense the earth for what she is presumably about to harvest. On the opposite side of the vase, a young male and female approach each other in what may be an impersonation of the sacred marriage. A more explicit example of the sexual magic employed in the harvesting of a particular miraculous herb in the Hellenistic period is recorded in Josephus, who claims that menses and female urine were used to entice the plant into standing still while being cut (*BJ* 7.181).¹⁰

⁹440-400 B. C. British Museum, Catalogue of Vases III 387 no. E 819.

¹⁰For further examples of sexual mimesis in ancient plant gathering, cf. Allegro, *op. cit.*, chap. 9, "The Sacred Prostitute," 76-82.

The numerous depictions of maenads engaged in tending the infant Dionysos, whom they have found amidst plants on the ground, or in fending off the lascivious advances of the adult god's ithyphallic satyrs are probably to be understood as illustrations of the type of fantasies which were involved in Dionysian herbalist procedures. It was in the Nysian plain, for example, that Persephone had been picking flowers when she met her lover Hades (Hom., *h. Cer.* 17). One probable etymology for the name of Dionysos is that he is the "Zeus of Nysa" and, on the testimony of Herakleitos, Hades could be equated with Dionysos specifically as a god responsible for the maenadic ecstasy (Diels, *Vorsokr. Fr.* 15). Nysa, itself, suggests an etymological connection with the verb *nustazo*, "to doze or sleep," and would, therefore, be an appropriate place for the *narkissos* to be found. The name of Nysa seems to have been generic for the mountainous places which were sacred to Dionysos and the maenads' ecstatic rituals. Dionysos, himself, was born in a Nysa (Hdt. 2.146). After his birth, the infant was tended by his maenads, whose names give us some clue to the successive roles which they seem to have impersonated with regard to the intoxicant and its preparation. As the title of a lost tragedy of Aischylos indicates, they might play the role of his nurses (hypoth. in *E. Med.*), tending for the child whom another had born so that the plant's anger for being picked would not find them for its recipient. Amongst the names for these nurses can be found a Nysa (Terp. *Fr.* 8) and a "crow woman," Korone (D. S. 5.52.2). The latter name perhaps implies the dancing which the maenads performed in imitation of birds, as depicted on vase paintings; birds were often associated with magical plants as materializations of their guardian spirits (Thphr., *HP* 9.8.6; Plin., *H. N.* 25.29; Ael., *VH* 9.32). Apparently, after the correct preparation of the intoxicant, the maenads ate their own children (Plu., *Moralia* 38; Ael., *VH* 3.42; Apollod. 3.4.3, 3.5.2, 2.2.2; Nonn. 47.484 ff., 48.917 ff., 9.49 ff.). The same nurses who had raised the Dionysos of Nysa then became members of his ecstatic band of bacchantes as his brides (*h. Hom.* 26), in which role they were often identified. Maenads could have "horse names" like Leukippe, who was one of the maenads who ate her son at Orchomenos (Plu., *Moralia* 38); the horse connotes both sexuality and transport and it was as equine satyrs that the god most frequently seems to have materialized to his devotees. The women thus were apparently both quasi mothers and brides of the same male deity. An Attic black-figured vase depicts the infant Dionysos being given to Ariadne.¹¹ In myth, she was his bride and, according to the legend of her Cyprian cult, she was said to have died in childbirth (Plu., *Thes.* 20.3) and, like another Persephone, she was his queen in Hades (Hom., *Od.* 11.325).

The exact herbalist procedures no doubt varied from place to place and from time to time. It is not possible to be exact about activities

¹¹Baltimore, Walters Art Gallery, cat. no. 48. 11.

which were largely secret and which are represented in literature only in mythologized form, but the central importance which these Dionysian rituals occupied in Greek society should suggest to us that herbalist patterns and metaphors in literature would have been readily comprehended. The details of Euadne's clothing and utensils, for example, as well as her abandonment of the child and return after an interval of days may constitute specific reference to a ritual act. It is, furthermore, not possible to identify the Dionysian intoxicant with any certainty. It too, no doubt, varied and may always have been a compound of different toxins. That opium was sometimes associated with the god, probably in Eleusinian contexts, is suggested by a red-figure vase from southern Italy which depicts Dionysos amongst his maenads as a mature young man, apparently the son of Persephone by Hades; he wears a crown of poppy capsules on his head.¹² Mycological lore also is relevant to certain attributes of the deity. Like the mushroom which was thought to be engendered by lightning (Ath. 2.62b; Plin., *H. N.* 22.100), Dionysos was conceived when the bolt of Zeus struck the Theban Semele. The "thunderbolt" or *keraunion* was the name of a particular mushroom (Thphr., *HP* 1.6.5). Hyginus records an interesting variant for the god's birth in which Semele conceived him by drinking a potion which contained her son's heart and thus had ingested the son who converted into the role of lover in order to beget himself (*F.* 167); such a paradox is explicable in terms of the intoxicant's dual role toward his mother and his bride. The mushroom, furthermore, had phallic connotations, for *mykes* was a metaphor for the penis (Archil., *Fr.* 34 Diehl). It also connoted the chthonic world of Hades, as is shown by the numerous stone grave monuments which are of fungoid, rather than phalloid, shape.¹³ A punning on *mykes* and *mykema*, the "bellowing call of bulls," furthermore, united the deity's botanic and taurine manifestations, as in the Mycenaean meadow of "bellowing mushrooms" in a fragment of Aristias (Nauck, *TGF* p. 727; cf. E., *Bac.*, 689 ff.; A., *Fr.* 57).

Both Pitane and Euadne experienced their romances on the banks of rivers. Oreithyia's caprice with Pharmakeia took place along the Ilisos. The maenadic connotations of such locales can be sensed in Sophokles' description of Deianeira's courtship in the *Trachiniai*. She is a daughter of a "wine man," Oineus (6), and she was wooed by the river Acheloios, who manifested himself to her as a bull, a serpent, and a man with horns. When Herakles arrived to save her, he leapt into the river, but the moment of combat is conveyed as a confusing medley of a river and a

¹²A. D. Trendall, *Frühitaliotische vasen*, pl. 24.

¹³Donna Kurtz and John Boardman, *Greek Burial Customs* (London 1971) 242-4: "It would be easier to accept these as phalloi if any one of them bore the slightest resemblance to the organ with which Greek artists were well familiar. The asymmetry of the glans, and the duct and the testicles are never shown, and the knob is often flat, hemispherical or spherical. The only group of objects which all these "phalloi" can be said to resemble is fungi."

bestial Herakles (497 ff.) so that Deianeira, who could not bring herself even to witness the event, has remained ambivalent about her husband's role as her savior or her destroyer (26-7). While crossing another river on what was apparently her bridal journey (563), she was attacked by a centaur, from whom she was again rescued by Herakles; but the dying centaur managed to convey the poison from Herakles' arrow to Deianeira in the form of a love potion composed of his own poisoned blood. When Deianeira uses that untried philtre to attempt to charm Herakles' love back from Iole, she discovers that she and Iole are flowers of different sorts (547-9) and that the potion reveals its true nature like the foaming juice of the Bacchic vine (701-4).

In Pindar's narrative about Iamos, the river is the means whereby the son is reunited with his divine paternity. The vegetative nature of Iamos continues in the poet's description of the child's growing to manhood: "he seized the harvest of that delightful and golden-wreathed goddess who is Youth" (6.57-8). He walks into the river and in mid-stream calls upon Poseidon, his divine grandfather, and upon Apollo, his father, asking for his birthright and inheritance. At night, beneath the open sky, a voice answers him, commanding him to rise and follow. The voice is Apollo's inspiration and Iamos journeys with it toward the future, when he will receive a second voice, which will be that of Zeus, once the hero Herakles will have founded the Olympian sanctuary, where the descendants of Iamos will function perpetually as prophets. That journey toward the future balances the journey which Pindar, himself, had taken earlier in the ode toward the past in order to uncover the origin of his patron's prophetic ability; he had found it in the birth and inspiration of Iamos and that discovery, in turn, inspires Pindar, too, to journey toward the future with his patron. Hagesias, as the troop of dancers makes its way toward a distant celebration across the water in a new land, where he now resides. There they will sing of Persephone, who was carried away by the white horses of her lover from Hades, and of the mother Demeter, whose feet are colored crimson-purple, and of Zeus, who has subdued the chthonic forces of the Aetnean volcano. The theme of the mythical prophet Amphiaraus, who earlier in the ode had been swallowed beneath the earth at Thebes with his horses, is repeated in this final rearrangement of the maiden-mother mystery into an Olympian or redemptive configuration.



The child of a parental couple is actually two children, the mother's child and the father's child. Ion, in Euripides' tragedy, endures a delightfully confusing series of recognitions as he comes to learn of his parentage. The intrigue involves his twice rejecting the mortal contenders for parenthood, for he mistakes his would-be father for a lecherous pederast (517 ff.) and his mother for a murderer (1395 ff.). Each time, moreover, that he accepts a parent, the question of the other member of the

couple leaves him open to the possibility of bastardy, with lowly rather than divine lineage.

Kreoussa, the Athenian "queen," and her foreigner husband Xouthos have gone to Delphi to consult the oracle about the sterility of their royal union. Actually, each of them has had a child and Ion, the temple servant, will be recognized by each of them separately as a son of an illicit union. Two versions of Ion's birth are elaborated in the play. In one version, Kreoussa conceived a child by Apollo at Athens. She was gathering flowers, like so many similar women, when she found her lover; she was picking gold-reflecting *krokos* flowers¹⁴ into the fold of her gown when the god revealed himself to her with his golden hair glistening in the light (887 ff.). The place was named the "Great Rocks," a cave on the north slope of the Acropolis. It was involved in some way with something which is called the "Pythian lightning bolts" (*ἀστραπαὶ τε Πυθίαι* 285) and with Apollo as the slayer of the Python serpent. It seems to have been a place for the enactment of certain maenadic rites. Pan played his pipes there to accompany the dancing of a group of women called the "Society of Aglaurai" (492 ff.; cf. 936 ff.). The Aglaurai were the original daughters of the autochthonous king of Athens, Kekrops. Athene had entrusted her serpent child, Erichthonios, to them and they went into a fatal, mad ecstasy when they opened the basket in which he had been concealed (21, 268 ff.). The autochthonous birth of Erichthonios, in fact, is cited as the precedent and model for the birth of Ion (20-1); and Kreoussa is a granddaughter of Erichthonios. Her father Erectheus had died in this same cave. He used to slaughter his own virgin daughters on behalf of Earth, and Kreoussa alone had been spared since she was only an infant when Erectheus descended into the chasm which opened when Poseidon, in his contention with Athene for the possession of Attica, struck the ground with his trident; the spring which resulted was located in the cave of the Great Rocks (277 ff.). When Kreoussa's son was born, she had imitated the action of Athene with the serpentine Erichthonios. She exposed Ion in a "circular basket chest" (19; cf. 36), as was the custom in her family, placing two golden serpents as ornaments upon the infant. The place for this exposure of the infant is the same cave in which he had been conceived (17) and, according to Kreoussa, it was in that place that he had also been brought to birth (949; cf. 16); that parturition occurred in the same cave as the picking of the flowers for the child's conception suggests a botanic pattern in the mystery of the birth. The basket in which Ion was exposed is seen at the end of the play, when it serves as the symbolic token, confirming the identity of Ion as Kreoussa's child: the proofs are a sample of Kreoussa's weaving which depicts the Gorgon head with a border of serpents in the manner of an aegis, the gold serpents

¹⁴The color of the plant is no doubt the significant element; oil of *krokos*, however, had soporific properties: Dsc. 1.64.

of the Erichthonian rite, and a wreath of eternal olive, which was Athene's pledge to Athens in her contest with Poseidon (1419 ff.). When Ion at last is recognized, Erectheus will have been reborn in him (ἀνθρᾶ δ' Ἐρεχθεύς 1465). Thus, Apollo, who slew the serpent, will have begot a child who renews the serpent's lineage. It is perhaps even suggested, by means of a pun on the poison, *ios*, and the participle of the verb "to be," *ōn*, which resembles the participle *iōn*, that Ion had connotations which associated him with toxins and serpents (δρακόντων ἰδς ὦν τῶν Γοργόνης 1015).¹⁵ Such an etymology for Ion would be appropriate for the figure to whom, as Nicander recorded, certain "Ionian brides" presented *ion* flowers (*ap.* Ath. 15.681d, 683a). Athene's Erichthonios, however, had destroyed his foster mothers; Ion had been entrusted to the foster motherhood of the Delphic priestess, the Pythoness, whose prophetic ecstasy is controlled by ritual. She will assign him to his would-be father, Xouthos.

It is this false father who names Ion via a trivial etymology which is repeated several times in the play (534 ff., 661 ff., 802, 831). He is *iōn* or "going," the first person whom Xouthos meets as he "goes" out of the temple of Apollo. Xouthos is a foreigner at Athens compared to the autochthonous descent of Kreoussa. His name designates him as the "tawny-yellow" man, a color like Xanthos, the epithet of Apollo, and like the "saffron" *krokoi* which Kreoussa had been gathering when she encountered her yellow lover. The chthonic element predominates in Xouthos' background. He is, himself, a son of the serpentine north wind, Aiolos; the Delphic python was a representative of that wind and Xouthos seems to be not only mortal instead of divine but also an antithetical figure to Apollo. As a lover, he would suggest the opposite configuration to the elements which predominate in Apollo. These chthonic or, perhaps, even Dionysian connotations of Xouthos will be redeemed through substitution and rearrangement in the course of the tragedy. When Xouthos arrives for the first time onstage, he is probably impersonated by the same actor who had delivered the prologue as Hermes. Such doubling of roles would have been noticed by the audience since, as we know, prizes were awarded to actors in the festival competition; and since the poet served as his own director, doubled roles probably indicate something about his structural concepts in composing his drama.¹⁶ Xouthos, therefore, is a former Hermes, an idea which de-

¹⁵A. S. Owen, *Euripides' Ion* (Oxford 1939) ix, n. 2.

¹⁶Whether or not the sequence of roles which an actor impersonated for each play had any significance, either consciously or in some subliminal manner, is a much vexed subject. In a forth-coming essay in *Arethusa* ("Duality and the Madness of Herakles"), I have attempted to demonstrate that the doubling of the Lykos and Herakles roles has thematic significance in that the two figures are related as antithetical versions of the same metaphorical structures. A similarly significant doubling occurs in Sophokles' *Trachiniai*, where the Deianeira actor also plays Herakles; by structural design, the two lovers can meet only at the

velops the essentially chthonic significance of his stage configuration. Xouthos, at the opening of the play, had been away consulting the Trophonios oracle (300, 393, 405) in his native Boeotia, a ritual which involved actual descent and lengthy incubation in a cavern. When he returns for his entrance in the play, he asks Kreoussa whether his long absence had made her suspect that he had died; her fear hadn't gone to that extent, she claims, but she had been a little concerned (403-4). From the subterranean oracle, Xouthos thus passes into the temple of the oracular priestess of Apollo and receives the omen whereby he will falsely recognize his son in the temple boy, Ion, who, of course, must have had some other name before Xouthos names him "Going." Xouthos thinks Ion must be the child whom he had conceived once upon Mount Parnassos at Delphi during a night-time, torch-lit Bacchic festival, when he had got drunk and had an affair with a maenad (550 ff.; cf. 676 ff.). This mountain is thematically similar to the place at Athens where Ion was conceived: it was the site of the cave where Apollo slew the serpent and of the Bacchanalia which occurred during the absence of Apollo in the realm of the Hyperboreans, which was thought to lie beyond the north wind. This northern realm perhaps would commonly have connoted also movement along a vertical plane toward the stable polar star, which marks the northern direction; Boreas blew both from the topographical north and downward into Hades and, therefore, he was, for example, an appropriate mate for Oreithyia as she engaged in her activities with Pharmakeia.¹⁷ In Xouthos' maenadic version of Ion's birth, the child is the same as in the other: he is a child of Earth (542), the "son of a son of Zeus" (Διὸς παιδὸς γενέσθαι παῖς 559), a formula which could describe him either as Apollo's or Dionysos' son. The chthonic and Dionysian elements in his conception both at Delphi and at Athens will be redeemed through the rejection of his false claimant to paternity in favor of Apollo and through the tragedy's burlesque treatment of serious themes.

When Xouthos recognizes his supposed son by the maenad, he celebrates the event with a drunken banquet, one which, in fact, is meant to induce a drunken intoxication (ὥς θᾶσσον ἔλθωσ' οἷδ' ἐς ἡδονὰς φρενῶν 1180). He goes off to the same mountain where he believes that he

moment when one destroys the other, an idea which is stated as a metaphysical pattern in the *parodos* (94 ff.). On the doubled role in the *Trachiniai*, cf. M. McCall, "The *Trachiniai*: Structure, Focus, and Herakles," *AJP* 93 (1972) 142-63. The doubling of the roles of Hermes and Xouthos in the *Ion* is, of course, a more subtle example and perhaps indicates more about the author's structural conception of his drama than about audience response.

¹⁷Cf. A. E. S. Butterworth, *The Tree at the Navel of the Earth* (Berlin 1970) 29. Boreas carries Odysseus to the underworld since it blows from directly overhead. The role of Boreas as the lover of Oreithyia and Pharmakeia is also interesting in view of the horse symbolism involved in the maenad's rituals: Boreas was thought to be able to fertilize horses (Hom., *Il.* 20.221; cf. Verg., *Georg.* 3.274-5).

begot his son, intending to slaughter a bull on the Dionysian peak of Parnassos (1125-8). Meanwhile, he leaves his son nearby to supervise the entertainment in a tent. The elaborate scenes which are depicted in the tapestries which form the tent place Ion in an enclosure of symbolic heraldry, like the sample of Kreoussa's weaving with which the mother had covered him as an infant when she had exposed him as a prey for birds. Kreoussa's heraldic ensignia, however, had been clearly chthonic; in the tent, Ion is surrounded by depictions of the constellations and the heavenly bodies: only at the entrance is there a portrayal of the serpent Kekrops with his Aglaurai daughters. The tapestries are all part of the spoils which Herakles had won from the hostile females who were called Amazons. In this tent, Ion is obviously about to experience some sort of initiatory transition which will move him from his chthonic, earth-born origins to a status in which the supernal connotations will predominate. The parodos ode had offered a similar symbolic enclosure for Apollo in the description of the Delphic temple which housed the god and his inspired priestess: the chorus of women tourists from Athens had described the scene with Herakles and Iolaos in their battle against the hydra, a design which the women, no doubt significantly, claim to have converted into a tapestry back home; they then described the anti-chthonic role which Pallas Athene is seen playing in her battle with the Earth-born Giants; and finally, they passed on to the description of the chthonic thunderer, who is Bromios or Bakchos, the son of Earth (184 ff.).

The revel which Xouthos has planned is abruptly changed into an intoxication of another sort by the arrival of the poison which Kreoussa sends via the old man who had been the *paidagogos* or "child leader" of Kreoussa's father Erechtheus (725-6). Kreoussa does not know that Ion is her son and she believes that she is destroying Xouthos' son. The poison with which she attempts to kill him has an interesting provenance. The Gorgon was a child of Earth and was Earth's ally in the battle of her creatures against the heavenly gods; Athene killed it, wearing the aegis, which was her thorax armor composed of vipers. Pallas gave that aegis to Erichthonios, her own first-born son to come out of earth; and with that aegis, she gave two single drops of Gorgon blood in separate containers. Each of the drops is of a different effect; one is deadly, while the other is a drug which acts as a panacea. Kreoussa has inherited these drops of antithetical toxins from her father and she wears them on her arm as part of her stage costume. It is clear that she is a stage figure who is constructed upon the pattern of the maenad's ambivalent encounter with the ecstasy induced by her botanic child and lover. Like the infant whom the maenad picks, she, too, is often represented in transubstantial existence with the toxin. Thus, for example, Deianeira in Sophokles' *Trachiniai* leads her chorus of maidens into the terrible mysteries of maternity by testing the centaur's poison, which she hopes will make Herakles again into her lover but which in-

stead causes his death. In the murder plot of the *Ion*, Kreoussa chooses to reveal her terrible potential and plans to poison her son's wine (985 ff.; cf. 1478 ff.). Kreoussa's symbolic stage configuration, moreover, is similar to that of the heraldic tokens in the basket, through which she will convert into her more beneficial aspect. The chorus invokes Persephone-Hekate to send the poison to its destination (1048 ff.), but, as it turns out, Ion does not die. A *komos* or revel band of pigeons (*κῶμος πελειῶν* 1197) will intervene to drink the poisoned wine and die in a Bacchic fit (*κάβάκευσεν* 1204), thereby saving Ion, who originally was to have been a prey for birds when he was exposed to die as an infant (1494-6; cf. 504-5). This redemptive role for the birds is a serious treatment of the burlesque elements in Ion's earlier monody, which he had sung as he swept the steps of Apollo's temple, shooing the birds away from the sanctuary so that they would not leave their droppings there at Delphi (162 ff.). The birds in that song were described as rather grotesquely large: an eagle (158) and a swan (162); and the language suggests that the scene was staged with an extra chorus of bird dancers (*τίς ἔδ'* . . . 170 ff.), one of whom apparently enters with a bundle of faggots, intending to build its nest on the temple. Ion could not, however, kill the birds since birds are omens and he could merely shoo them off to other sanctuaries.

The two versions of the birth of Ion, the child of Kreoussa and the child of Xouthos, which are both Dionysian versions of an Apolline begetting, merge in the mystery of the sixth night of the Eleusinian initiation. After sending the Gorgon drops in the custody of Hekate to Ion, who is the outsider hoping to usurp the autochthonous kingship of the Erechtheids, the chorus describes the dancing ground in front of the Kallichoros well at Eleusis, where Demeter had mourned for the loss of Kore, who had been abducted by Hades. There, on the night of the twentieth of Boedromion, the month which was named after the aid which Ion would one day afford the Athenians in the war against the Eleusinians, the stars and the moon and the fifty daughters of Nereus seem to take part in the dance which honors the Eleusinian duo of maiden and mother. It is a sacred moment, when Kore's son, Iakchos, the god of many names, whose special day that twentieth was, watches the night-long revel. It seems inconceivable to the choral women that the "Apolline wanderer" (*ὁ Φοίβειος ἀλάτας* 1089), who is the child "Going" or Ion, should intrude himself there at that sacred moment as "king," the Athenian official who conducted the mystery. In antistrophic choreography, the chorus demands a palinode (*παλίμφομος αἰοιδά* 1096), a recantation for the songs which tell of their nights of illicit love, such as those apparently at which Kreoussa conceived her lost, unknown child. Those slanders, "going with the Muse" (*κατὰ μούσαν ἰόντες* 1091), reproach women for their love affairs although women's "tillage" is more holy than men's (*εὐσεβία κρατοῦμεν ἄδικον ἄροτον ἀνδρῶν* 1095-6). Just as it had been the poison which the women had sent at the

ode's beginning to fill the *krater* or mixing bowl with death, now it is the slander which goes its way toward the men's party. "Let it go!" the chorus cries (*ἴτω* 1097), for Xouthos has begot an illicit son of his own. Xouthos is called the son of Zeus (*ὁ Διὸς* 1099) since he is the god's grandson, but the term describes both Apollo and Dionysos more closely. The poison and the going songs about the maenad's sacred marriages thus go to Going, the Apolline wanderer who intrudes at Eleusis, although, once he is correctly recognized, he will be seen to be appropriate there not only as an Erechtheid but also, like another Iakchos, a kore's son, the product of her love affair with earth's tillage.

When it is all over, Athene enters to confirm the birth of Ion, thus mediating between the two versions of who he is. Her appearance is appropriate since Ion is a child like her own Erichthonios; the chorus had invited her in the first stasimon to come together with Artemis, her sister in perpetual maidenhood. They both had been invoked to allow Kreousa and Xouthos to have a son (452 ff.). Both Athene and Artemis were said to have functioned as midwives for the parturition of their brother Apollo from Leto. In Ion, who is the ambivalent toxin from the Dionysian earth transformed into celestial status as Apollo's son, the two generic identities for the maenad's divine son and lover in the sacred marriage are united. Like another Iakchos, Ion redeems the kore's loss of her maiden self in the transition to motherhood by converting the chthonic lover into the triumphant son whom she conceived in Hades by her celestial mate. Kreoussa with Apollo and Xouthos with the maenad have all contributed to produce the son who mediates the antitheses of autochthonous and alien origins, chthonic and supernal parentage.

"Why," as Ion asks, "did Apollo give his own son to another man and say I was born by Xouthos?" (1532-3). The answer simplifies the mystery: a friend might give his own son to a friend so that he could be the inheritor and master of a house (1534-5). Ion, who is the foster son of a foreign male and the autochthonous child returning from orphanage in another land, will eventually, through the four sons from his "root," be the ancestor of the Ionian peoples of the islands and Asia (74, 1571 ff.).

* * *

Mythology always suggests a multiplicity of determinants and no one system can ever be expected to deplete its meanings. In drawing together certain ethnobotanical elements, I do not intend to imply that this was the sole significance of these two works of art. It is probable, however, that the poets and their audiences would have recognized levels of meaning in the figures of Iamos and Ion which for us are only dimly perceived because we lack personal experience of the plant-gathering rituals and their role in the complex of Eleusinian, Dionysian, and Apolline religions. Without attempting to explain what goes beyond our available evidence, I should like to summarize what seems to me to be incontestable in the two works which I have discussed.

The naming of Iamos is a theme of central importance in Pindar's poem and is emphasized by the symmetrical design of the composition. The etymology of his name is clearly based on the details of the birth scene, which involves the beneficial *ios* toxin of serpent/bees and an extraordinary profusion of *ion* flowers which have a broad range of colors in a particular area of the spectrum. The name, furthermore, is indicative of Iamos' inspiration as a future prophet and founder of a hereditary line of prophets. He is allied both to Poseidon and Apollo and his priesthood is apparently that of Zeus, although Iamos will have to wait until Herakles will have tamed and established the Olympian sanctuary. The poet, himself, in the design of his ode, plays with the theme of prophecy, structuring the poem on present, past, and future times and stating his own credentials as a prophet. One further thematic couplet introduces Eleusinian elements in the chthonic death at Thebes of the prophet Amphiaraus because of a woman and the later Persephone-Demeter duo at Syracuse in association with Zeus, who has subdued chthonic elements. This latter version is appropriate to the whole ode's modulation toward insubstantial future time in the shift from a real performance at a present celebration to a not yet realized performance at a distant place. In a similar manner, autochthony yields to motion toward foreign residence.

Naming is also a central theme in the *Ion* tragedy, which is structured upon a crisis of identity resulting from two divergent versions of the hero's parentage. His Apolline begetting occurred during the gathering of flowers at a place associated with chthonic rituals, in particular that of the maiden's descent into Hades at a source of water which was sacred to Poseidon. The other version of his begetting occurred during a maenadic ceremony at Delphi and involved a male, who despite his epithet, which is similar to that of Apollo and the yellow lover of Kreoussa, is associated with chthonic realms both via his own parentage and his recent incubation in the Trophonios cave. The tragedy presents the initiation of Ion into symbolic celestial status via a Dionysian revel during which he is rescued from a fatally toxic wine; the tokens of his identity present him as he was born, in the midst of a heraldry of serpents and chthonic monsters. The duality of his descent seems to have some meaning with regard to the role of Apollo—Dionysos at Eleusis. It is probable that such a duality implies something about the ambivalent status of toxic plants and the ecstasy of the sacred marriage which results from them. Kreoussa as the chthonic bride of Apollo is balanced in the tragedy by the child's foster mother, who is Apollo's divinely inspired Pythoness. Despite the serious patterns which structure the play's controversy about Ion's parentage, the tragedy, however, is a delightful burlesque and should not be expected to be making some kind of allegorical statement about the interrelationship of Dionysos and Apollo.



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Henbane—Healing Herb of Hercules and of Apollo

This poisonous drug, formerly available only from Europe, India and the Sudan but now produced also in the United States to the extent of 80,000 pounds annually, has been used therapeutically since ancient times and today has common use in modern medicine.

GEORGE M. HOCKING¹

Introduction

HENBANE is an official drug in the United States Pharmacopoeia where the name "Hyoscyamus" is used for both the English and Latin titles. It is described as consisting of the dried leaves with or without the flowering and/or fruiting tops of *Hyoscyamus niger* L. Likewise official in the U. S. Pharmacopoeia are the herbs prepared from the two other most important medicinal members of the family Solanaceae, namely, belladonna (*Atropa Belladonna* L.) and stramonium (*Datura Stramonium* L.). Of parallel value, therapeutically, they likewise have all been official in the U. S. Pharmacopoeia since this chief official compendium first appeared in its 1820 edition. The importance of Henbane is further witnessed by its being official in nearly if not all present-day national pharmacopoeias, approximately 20 in number.

Besides the leaves, optionally with tops, other parts of the plant have been used, either officially or unofficially, *viz.*, herb, seeds, fruit, root, stalk (Dioscorides), *etc.*, not to mention the expressed juice and the smoke.

Geographical Origin and Distribution

The species *Hyoscyamus niger* is believed to have been originally a denizen of Eurasia, and is now distributed

throughout Europe from Portugal and Greece, on the south, to Norway and Finland, on the north. It is found also in the Caucasus, Iran, throughout Asia Minor, in northern India and even in Siberia. The plant has been naturalized in North America, at least since about 1670, and now grows wild in the eastern, northern and western United States and in parts of Canada. It occurs chiefly in waste places, such as near buildings, on roadsides, in graveyards, old gardens, and in areas covered with rubbish from ruined buildings. In habitat, therefore, it considerably resembles its relative, stramonium, except for its more northerly distribution. The plant is now cultivated for medicinal use in a number of countries, including our own.

Common Names

As one might reasonably expect from its importance, the species under discussion has acquired many common or vernacular names. The most important names applied to the plant and the derived drug are in English: Henbane, so-called, maybe, because the seeds are said to kill fowl; Henbain; Hyoscyamus Leaves; Hyoscyamous; Henbane Leaves; Common Henbane; Black Henbane; Stinking Nightshade; Foetid, or Fetid, Nightshade; Insane Root; Poison Tobacco; Soldier's Herb; Soldier's Tree; Hogbean, because the plant is said to be eaten by hogs; Hog's Bean; Hogbane (?); Hen-bell. Older English words almost never heard now include belene;

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chenil(1)e, apparently stolen from the French; brosewort (?); hanebane; hainbane; henkam; hennebane; hennebone; hennibone and Stinking Roger.

In Latin the species has been variously known as *Hyoscyami Folium*, a title used by the International Pharmacopeia; *Hyosciamus*; *Herba Apollinaris* or *Apollo's Herb*²; *Symphoniaca Herba*, on account of the resemblance of the flowering and fruiting axis to the musical instrument of that era known as the symphonia; and *Jusquiamus*.

In France *H. niger* has been called la *Jusquame* from the Latin "*Jusquiamus*"; *Jusquame Noire*; *Potelée*; *Herbe-des-chevaux*; *Hanebane*; *Hanibane*; *Hannebanne* (Gaston Bonnier), and so on. In German the drug is (Schwarzes) *Bilsenkraut*; *Bilsen*; *Dullkraut*; etc. In Dutch the species is known as *Bilsenkruid*, etc.; in Norwegian, *Bulmeurt*; in Swedish, *Bolmört*. The common Spanish name is *Beleño* (*Hojas*); the Portuguese, *Meimendro* (*Folhas*); the Italian, *Giusquiamo* (*Fogliass*).

Description of Plant

Hyoscyamus niger occurs in two distinct forms. One of them is the annual plant, of interest as having been specifically excluded from some pharmacopoeias (e.g., U.S.P. 1880, 1890, and the eighth revision). The plant seldom grows higher than two feet, is slender in habit and little if at all branched. Its various parts develop on a smaller scale than in the biennial form. The leaves are less distinctly toothed and the corollas show little or no purplish veining. This is the form of the plant which was cultivated by the "herbalists" of a bygone generation.

The biennial form appears to be much the commoner. For instance, Stewart found that when seed of wild-growing Montana plants was sown, the biennial

forms were produced.³ During the first year of growth the plant develops a large whitish, fleshy, tapering, branched root, somewhat resembling that of a parsnip or small horse-radish, crowned by a radical rosette of large leaves, a foot or more long, with very long petioles and coarsely toothed, lobed or deeply cut blades. No aerial stem is produced. During the second year the plant throws up an erect, thick, coarse and widely branched stem, two and a half to four or even five feet tall, which bears flowers in long, secund, leafy, spike-like groupings. The flowers in this form have prominent purple vein markings on the corolla. Fruits are formed within the permanent calyx, and as these mature, the entire plant dies. At this stage the root becomes spongy and then hollow, and the radical leaves disappear, while those on the stem are found to be quite broad with relatively short petioles or even sessile near the top of the stem.

Wild growing plants near Bearmouth, Montana, were found by Stewart to have, instead of one flower stalk, as customary, several stalks (up to twelve) growing from a single root-crown. It was suggested that this was due to cropping of the first year's growth by sheep. The plants ranged from two to five feet in height, the taller growing in a shady ravine, the smaller in the sunlight on a hill-top. Undoubtedly the rich fertilized soil of the sheep corral, in which the plants grew, accounted in part for the luxuriant growth. No infestation or plant disease was noted, although such have been reported for plants growing farther east in Montana. Catnip, mullein and horehound were growing alongside. The plant thrives well in Montana to over 7,000 feet elevation, and in India it has been reported from altitudes of 8,000 to 11,000 feet.

³ These and other data in this article relating to Montana Henbane, unless otherwise stated, were gleaned from the unpublished M.S. Thesis of George W. Stewart of the State University of Montana, 1934, kindly loaned to the author.

² Apollo of the Greeks = Hercules of the Romans.

Cultivation

Some people who have cultivated a variety of medicinal plants state that henbane is one of the most difficult of its family to rear successfully, *i.e.*, to produce a drug meeting official requirements.

Experiments in cultivation have been carried out in the Drug Garden of the School of Pharmacy at the State University of Montana (Missoula). The seed used was collected from a plot of wild-growing plants near Bearmouth, about 40 miles from Missoula. Seed was gathered the last of August and sown on April 15 of the following year (*ca.* 1933). Before planting, it was treated with 5% sulfuric acid for 20 minutes, then washed with water and dusted with lime to neutralize and provide calcium for the seedlings. Small shoots developed in about three weeks. The plants were thinned out several times during the season. Growth continued until the summer, when an arrest of growth occurred with the plants one-half to one foot high. The following spring the plants sent up flowering stalks which bore blossoms in July. These biennial plants appeared free from disease or infestation, although untreated by spraying, *etc.*

The transplanting of henbane seedlings from a greenhouse or cold-frame to the outdoor area has not been very successful, for most plants do not survive the shock of moving, and those that do are stunted in growth. This is said to be caused by injury to the tap root. Better results are achieved if plants are allowed to attain fair size before being moved.

Because of this obstacle to large-scale propagation, the Wisconsin Pharmaceutical Experiment Station at Madison years ago undertook experiments to determine whether the seed might not be sown directly in the fields, as is done with stramonium. Biennial seed was

accordingly sown in early December, 1916, and began to come up about May 10, 1917, while some of the same seed sown on April 21 came up on May 16. Besides taking only one week more to emerge from the soil, the spring-sown seed gave a more uniform stand.

In growing henbane it is best to select a level area, as free as possible from weeds. A well drained fertile sandy loam or silt loam is considered best. One pound of seed is enough per acre and should be sown in rows two feet apart. If kept dry, henbane seed remains viable for several years, a fact which accounts for certain reported vagaries of growth. It is best to test germination of the seed before sowing. The best seed is that which has been specially collected for planting purposes. Pre-treatment of seed with concentrated mineral acid was reported to result in germination in about 20 days rather than the usual 30.

Sowing may be done by mixing the seed with sand and dropping it into shallow holes. Better still, a small seeder will give more uniformity. The seeding should be at such a concentration that one viable seed is laid every four inches along the row, and the seeds must not be covered by more than about one-quarter inch of soil.

Cultivation may be carried on before the young plants appear, if the rows can be distinguished or have been properly marked. Later on, regular weeding should be practised, and if necessary the plants ought to be thinned out so as to leave them about four inches apart.

Harvesting of leaves and flowering tops is carried out when the plants are in full bloom (June to August) and before the first frost. Drying is best performed in a drying house, where the herbage may be spread in thin layers on floor, trays, *etc.* Drying is hastened and color and quality improved by using a small amount of heat and air currents.

A yield of 600 pounds of Henbane per

acre may normally be expected. Almost twice as large a crop per acre may be obtained from the first- as from the second-year plants.

Infestations and Diseases

From the literature it appears that the Colorado potato beetle is henbane's worst enemy; it has been said to prefer henbane to all other plants. If the plants are not to be entirely destroyed by this pest, they must be sprayed with an insecticide. In the past, lead arsenate has been mostly used. Paris Green was found destructive to the plant, and sulfur soon loses its effect on the insects which prey on it. Two sprayings of 1 to 1,000 suspension of lead arsenate during the life-time of the plant are said to be adequate. Among the fungi reported as attacking *Hyoscyamus* are *Peronospora* (Phycomycetes) and the mildew *Erysiphe* (Ascomycetes).

Commerce

Before World War II most Henbane drug imported into the United States came from Europe, chiefly Hungary, Belgium, France, the Soviet Union, Germany and Italy. During more recent times exports have come chiefly from India, the Sudan, the United Kingdom, the Soviet Union and elsewhere, but the largest bulk has been domestically produced in the continental United States. At present the U. S. exports only a few thousand pounds of the approximately 80,000 produced here annually.

Montana is or recently has been the chief producing area for domestic Henbane, although the plant grows wild commonly in sections of the other north-western States, *i.e.*, Idaho, Washington and Oregon. The plant is said to have first been observed growing in Montana at Big Timber, in the year 1883. The plant grew from a pile of dirt thrown from the basement of an hotel under construction. It is thought that a workman

engaged in the labor dropped smoking tobacco admixed with the seed, since it is known that henbane seed has sometimes been mixed with tobacco to bestow a narcotic effect.

The species was subsequently collected in 1900 at Billings, Big Timber, Bozeman and elsewhere in Montana, and was spread to other parts of the State by admixture with hay, it is thought. Thus, the patch at Bearmouth is believed to have come from seed of plants mixed in hay for feeding horses used by convict labor when the Missoula-Deer Lodge road was built.

Henbane has sometime been marketed in grades representing stages of growth: (a) "Annual" or "seedling"; (b) "First Biennial", for leaves or herb of the biennial plant in its first year of growth; (c) "Second Biennial", for leaves of second year. The last item is scarce and high priced. In opposition to earlier opinion, first-year leaves have an alkaloid content similar to that of second-year leaves and are now considered equally as useful medicinally. However, they contain more acid-insoluble ash (sand, dust, *etc.*), no doubt because they are entirely basal leaves and not partly basal, partly stalk-leaves.

Description of Drug

The crude drug consists of much wrinkled, matted and broken leaves mingled with many stems and flowering and fruiting tops. The leaves are ovate to ovate-lanceolate, up to 26 cm. long and 10 cm. wide, not evenly divided by the mid-rib, the lower leaves petiolate, with petioles up to one-third the length of the blade, and the upper leaves stalk-less. The tips of the leaves are acute, the margins irregularly dentate (toothed) or pinnatifid (deeply lobed), with acute deltoid lobes. The upper surface of the leaf is darker than the lower. The leaf color is a shade picturesquely described by Parkinson

(1640) as a "darke or evill grayish greene colour". The same Apothecary and Botanist to the King gave the odor of the entire plant as a "heavie evill soporiferous smell somewhat offensive". Others have called it "dank", "benumbing", "narcotic", "noisome", "horrid", "heady", peculiar, strong, unpleasant, rank, distinctive, heavy, fetid, and so on. The aroma of Henbane has been compared to that of fresh tobacco, black currant leaves, and musk. The taste of the crude drug is bitter and acrid.

Henbane flowers are nearly sessile, with an unequally five-toothed, urn-shaped, hairy calyx, and a yellowish, campanulate, slightly zygomorphic corolla, with purplish veins. The corolla ends in five unequal obtuse lobes, and five stamens are inserted in its tube.

The fruit consists of a two-chambered pyxis (urn-shaped type of capsule which dehisces or opens by separation of a lid-like top) enclosed in the persistent calyx. When found, the seeds are black (hence the specific name of the plant) to dark gray, round-oval, numerous, tiny, unequal and hard.

The stems are two to seven mm. in diameter, somewhat compressed or cylindrical, longitudinally wrinkled and hairy.

The powdered drug is dull grayish-green to dark green. When examined under the microscope, it reveals calcium oxalate crystals in the form of monoclinic prisms, as twin crystals and as rosette aggregates (the latter not common). Non-glandular hairs are found, ranging from one to ten cells in length—these are often broken up in the powdered drug. Glandular hairs with a one- to four-celled stalk and a unicellular or multicellular secreting head also occur. Newcomb observed that very large branching non-glandular hairs, which had not previously been described for this plant, presumably because they are of relatively soft structure, are found on green plants and apparently soon dis-

appear when the plant is dried and handled.

Also observable microscopically are epidermis fragments with broad elliptical stomates having three or four neighboring cells, one of which is smaller than the others; fragments of tracheae with pores, reticulations and spiral markings; bast fibers; and pollen grains which are nearly smooth and bear three furrows.

Chemical Constituents

Henbane contains several important constituents, the two most important being the alkaloids hyoscyamine (crystalline) and scopolamine or hyoscyne (amorphous). Minor other alkaloids, e.g., scopoline and tropine, are present in traces.

Scopolamine was first isolated from the herb in 1833, and was obtained first from the seeds in 1871. It is a syrupy compound in the free state, but a crystalline solid in the form of the common salts. Scopolamine hydrobromide is official in the U. S. Pharmacopoeia and is used considerably in medicine, both by mouth and hypodermically. Henbane is not, however, the chief source, since this alkaloid is obtained mostly from *Datura* species, a related group in the Solanaceae.

The other alkaloid, hyoscyamine, is not now commonly used in medicine and is no longer official in the national compendia which serve as standards for American drug products.

Other components of Henbane which have been isolated are hyoscyperin (a glycoside), choline, mucilage, albumen, chlorophyll and potassium nitrate. The last compound (salt peter) is presumed to cause the characteristic sparkling effect seen when the dried leaf is ignited. The seed contains much fatty oil (about 25%) and also a little volatile oil.

Analyses of Domestic Drug

According to U. S. Pharmacopoeia XIII, the drug Henbane must contain

not less than 0.040% of the alkaloids characteristic of the plant. This is a lower requirement than that in earlier pharmacopoeias (*e.g.*, U.S.P. IX, X, where not less than 0.065% alkaloids was required, or U.S.P. VIII set 0.080% as a minimum).

Analyses of Montana Henbane, the chief domestic type, show that most lots are comfortably above the minimum required strength, as at present defined. Thus, one crude-drug concern⁴ has furnished the following values for commercial batches of the Montana product:

<i>Number of lots</i>	<i>Test (% total alkaloids)</i>
1	0.042
4	0.054
7	0.060
3	0.061
5	0.065
4	0.073
1	0.078
1	0.090
<hr/>	
Total 26	Average 0.0633 for all lots

From this it appears that 15 or more than half of the lots were below the former official strength, while the average assay of all lots was less than the former required figure. On the other hand, all lots meet the present minimum assay requirement, and one of them is more than twice as high as the needed assay.

Stewart found that the U.S.P. X assay method was unsatisfactory in assaying the Montana drug with which he worked⁵, due to the formation of very stubborn emulsions in "shaking out" the alkaloids. By this method the Montana drug assayed only 0.005% (aver-

⁴ S. B. Penick & Company, New York; data furnished through the courtesy of Dr. Thomas Lewis, Vice President and Technical Director.

⁵ Material was collected from wild-growing plants close to the Butte-Missoula highway near Bearmouth. The leaves and flowering tops were collected June 28, 1933, dried and ground to a #40 powder.

age), while commercial imported Henbane ran 0.0867% or about 17 times as high. To help remedy this, the drugs were first defatted with petroleum ether. Assays then ran higher (0.030% average for domestic; 0.078% in commercial drug).

In order to partially simulate conditions undergone by the commercial drug, the Montana material was heated at 95° for two weeks to drive off volatile matter. After this treatment the drug was of much the same color as imported material and had lost much of its offensive odor. In conducting assays with this, no difficulty was had with intractable emulsions, as before. Material so treated averaged 0.044% alkaloids (imported drug 0.071%).

Finally Stewart tried the method of C. M. Caines (1929), which seemed an improvement over other methods, and this gave results indicating a Montana product almost meeting the then current official standards, since the average of determinations was 0.057% (imported drug 0.081%).

Stewart also made other chemical studies on the Montana Henbane (same material as that used for alkaloidal studies). He obtained the following values:

Loss on air drying (25° C.)	88.18%
Total volatile matter ^a	10.89% (aver.)
Total ash	19.25% (aver.)
Acid-insoluble ash	
(not more than 12% allowed, U.S.P. X-XIII)	2.73% (aver.)

Successive extractions by Soxhlet method:

Petroleum			
ether	5.67%	(average imported,	3.35%)
Ethyl			
ether	5.10%	" "	2.49%)
Alcohol	23.91%	" "	16.87%)
Dist.			
water	20.68%	" "	20.99%)

Other findings were:

Crude		
fiber	6.11%	" "
Total nitrogen (in leaves)	4.24%	(average)

The seeds of *Montana* henbane were also studied by Stewart. He reported in his Thesis the following values from chemical tests carried out on the seeds ground to a fine meal (all figures are averages) :

Volatile matter (100° C.) ⁶	10.39%	
Total ash	2.87%	
Acid-insoluble ash	0.41%	
Successive extractions by Soxhlet method:		
Petroleum ether	32.63%	The bulk of this extractive (non-volatile) is of course the fatty oil.
Volatile portion (of crude)	1.95%	
Ethyl ether	31.14%	
Volatile portion (of crude)	3.42%	
Alcohol	24.61%	
Distilled water	6.60%	
Crude fiber	25.33%	
Total alkaloids	0.093%	(after defatting seeds)
“ “	0.130%	(by Caines' method)

The fatty oil was extracted from the seeds with petroleum ether, then the solvent evaporated and the oil filtered through cotton. The fixed oil constituted about 25% of the seeds (W/W). It was amber-colored with a bland innocuous taste and very little odor. The following constants were reported by Stewart :

			<i>Values of Bureš and Kracík (cold ex- traction)</i>
Spec. Gravity (25° C.)	0.9183		0.9120-4 (d15°)
Refract. Index (25° C.)	1.4739	
Saponification No.	191.72	(average)	187.8
Iodine Absorption No.	82.07	(average)	135.7

The figures for the *Montana* seed oil and that of Bureš and Kracík for plants grown in Czechoslovakia are far from

⁶ Determined by heating in oven at 100° C. until of constant weight.

concordant, but may be partly explained by the differing habitats and latitudes.

Derivatives and Preparations

It is typical of the human being to attempt to improve on nature, and in the field of medicine we find no exception. Instead of administering the whole leaf of henbane, or its powder, it has been customary to give either the so-called galenical preparations, such as tinctures, extracts, *etc.*, or the alkaloids. From an historical standpoint the preparations are of much greater importance, and the elegance and imaginative titles which have distinguished many of them are quite interesting. A mere listing of the titles, in some cases translated into English, is very revealing of the human ingenuity displayed in the administration of this one drug :

<i>Modern or Current :</i>	Syrup
Tinctures	Narcotic Boli (large pills)
Fluidextracts	Pills
Extracts (both semi-solid and powdered)	Pills of Extract
Fomentations	Narcotic (or Sedative) Pills
Compound Oils (Infused Oils, <i>etc.</i>)	Antichoreic Pills (for St. Vitus' Dance)
Abstracts	Anti-hysterie Pills
<i>etc.</i>	Anodyne Pills
Formerly popular (as described in the Universal Pharmacopoeia, published at Weimar in 1845) :	Anodyne and Resolvent Liniment
Anticephalagic	Pomade
Paste (for frontal headache)	Antispasmodic Elixir
Anodyne Cataplasm	Collyrium (Eye Wash)
Electuary for Hemoptysis (spitting of blood)	Sedative Narcotic
Conserve (made with white sugar !!)	Hauftus (Draught)
Oil of the Seed	Breast Draught
"Paregoric Oil"	Expectorant
Hemorrhoidal Ointment	Draught
Juice	Enema
Seed Extract	Infusion
Fecula (a starchy preparation)	Sedative Emulsion
	Anti-odontalgic Collyrium (Mouth wash for toothache)
	Narcotic Cataplasm
	Alcoholic Extract
	Essence

Tincture of Seeds	Anodyne Ointment
Ethereal Tincture	Tranquil Balsam
Green Oil	Ear Oil
Ointment	Sedative Liniment
Plaster	Compound Poplar
Unguen tum ad Ambusta seu Combustiones (Ointment for burns or burnings)	Ointment
	Hemorrhoidal
	Lotion
	<i>Etc.</i>

Uses in Medicine

The physiological action of Henbane is similar to that of Belladonna, Stramonium, Scopolia and similar drugs of the Solanaceae. While less powerful than they, Henbane is relatively more sedative and hypnotic and causes little or no constipation and other unwanted by-effects.

Ancient Uses. Henbane has been employed as a medicine from very early times. Baron Hammer-Purgstall actually believed "bendj" (Arabic for Henbane) was the *Nepenthe* of Homer. White Henbane was one of the "simples" used by Hippocrates (5th Cent., B.C.). This plant is quite similar to our Henbane in medicinal effects.

Dioscorides (A.D. ca. 60) called the plant "hyoscyamos" (literally "hog's bean"), but he also mentions "dioskyamos" (bean of the gods) as an outmoded name, possibly so-called from the usage of the drug in the temple "mysteries" or religious rites. In his works Dioscorides described three species—black, white and yellow. Of these he particularly commended the "white" as being the least dangerous. (As a matter of fact, it closely parallels black Henbane medicinally, although rather weaker in action). Dioscorides recommended the root with vinegar as a mouth-wash for toothache, and 17 or 18 centuries later we find still prescribed an Antiodontalgic Mouthwash made from a mixture of henbane and plantain leaves with violet and red rose flowers, poppy heads and sage leaves in water, properly processed. Not as useful perhaps as the

modern novocain or even clove oil, yet this preparation doubtless eased the pain of many a case of odontalgia. Another application of Henbane for the same purpose during the past few centuries has been that of burning the seeds and funneling the fumes into dental cavities in an effort to expel the "tiny worms" believed to cause the distress resulting from caries.

Pliny (fl. 60 A.D.) recognized the psychogenic qualities of the drug when he wrote:

"Henbane is of the nature of wine, and therefore offensive to the understanding, and troubles the head. . . . [It ought] to be used with great heed and discretion. For this is certainly known, that, if one take of it in drink more than four leaves, it will put him beside himself".⁷

An early contraceptive was made by mashing the seeds into paste with mare's milk and tying the paste in a piece of wild bull's skin.

In the Middle Ages Henbane was used legally as an anesthetic (with opium, mandrake, hemlock juice, aconite, datura, etc.) in the form of a "soporific sponge" and of the "pomander" (sleeping apple), acting through inhalation; it was also employed illegally as a sleeping potion, much as "knock-out drops" are used in our time. Gui de Chauliac of the 14th Century thus described the use of a narcotic inhalation:

I'll imitate the pities of old surgeons
To this last limb, who, ere they show their cut,
Cast one asleep, then cut the diseased part.

The medicinal popularity of Henbane dropped after the Middle Ages along with that of Belladonna, until by the 1700's it fell into disuse and was omitted from such compendia as the London Pharmacopoeias of 1746 and 1788, being returned only in the edition of 1809. Henbane was reintroduced into occidental medicine chiefly as the result of original labors by Professor Baron

⁷ Holland's translation (1601), revised.

Stoerck of Wien, who in 1762 carried out an investigation of the remedial value of Henbane, Stramonium and Aconite.

The Arabians, too, were familiar with the medicinal value of Henbane, as may be gathered in part from the following extract from that great anonymous classic, "The Thousand and One Nights":

"Presently he filled a cresset⁸ with firewood on which he strewed powdered Henbane, and lighting it, went round about the tent with it till

(digestion aider), sedative (nerve quietener) and antispasmodic (spasm antidote). Thus, Henbane has been used as a sedative in acute and chronic mania, epilepsy, hysteria, "hypochondriac monomania," delusional insanity ("madness")⁹, melancholia, nervous or irritable cough, tremor in paralysis, febris nervosa (where fever arises from purely nervous disturbances), insomnia with hallucinations, delirium tremens, priapism, *etc.* It is used for its anodyne properties in angina pectoris, arthritis,



FIGS. 1-4. Henbane growing wild in a sheep corral and elsewhere near Bearmouth, Montana. (Courtesy G. W. Stewart.)

the smoke entered the nostrils of the guards, and they all fell asleep, drowned by the drug".

Modern Uses. During the past century and a half Henbane has found many uses in western medicine, uses depending on its value as an anodyne (pain reliever), hypnotic (sleep promoter), narcotic, mydriatic (eye pupil enlarger), mild laxative, carminative

⁸ A holder for torches and other burning objects.

rheumatism, locomotor ataxia, colica pictonum (colic of lead poisoning, lead colic, or painter's colic), other colics, podagra (or gout), neuralgia, gastralgia (stomach ache), cephalgia (headache), teething of babies¹⁰, *etc.* As an anti-

⁹ Strange to say, Henbane is also said to cause insanity.

¹⁰ Formerly, pieces of the root were strung around the neck of the baby to form the so-called "anodyne necklace".

spasmodic it was and sometimes still is used in asthma, chorea (St. Vitus' dance), tetanus, constipation, whooping cough, phthysical coughs, croup, *etc.*

Hyoseyamus is sometimes used locally for applying to painful swellings, irritable ulcers, tumors, severe chordee, orchitis, *etc.*

A most important modern usage of Henbane and other solanaceous drugs is as a corrective for griping medicines, such as strong purgatives. It serves as an antidote in poisoning by mercury and other agents, and is occasionally used in treating the morphine habit.

Henbane is sometimes used also as an hypnotic, *etc.*, where opium derivatives cannot or are best not used, as for children.

Among the so-called "mydriatic" or "solanaceous" alkaloidal drugs, Henbane is ranked in importance next after Belladonna. The average dose is 0.2 Gram.

Non-medicinal uses include its employment for ages by professional poisoners. And finally, the leaves of the plant are said to repel mice.

Poisoning

The toxic properties of white Henbane have been recognized since long before the time of Christ. Poisoning comes about generally from the ingestion of doses larger than medicinal, and as a rule are seen where an overdose of medicine is taken, or where a part of the plant is accidentally consumed, as by children. Most recent poisonings described have been from one of the alkaloids.

Poisoning begins with the development of mouth dryness, burning throat, pupil dilatation, visual disturbances, giddiness, nausea and hallucinations. If remedial measures are not taken and the dose is sufficiently large, more serious symptoms ensue, such as difficult respi-

ration, delirium, feeble quick pulse, coma, convulsions and finally death by paralysis of respiration. Fairly characteristic is the reddening of the skin of face and neck, somewhat reminiscent of that in scarlet fever, but in later stages of poisoning the skin becomes cold and clammy, although the rash may persist even after death. Most characteristic of all, at least for the solanaceous group, is the persisting enlargement of the pupil of the eye. This mydriatic effect commonly continues for several hours after death.

Treatment is best conducted by washing out the stomach with a stomach-pump, using tannic acid in the wash water. As antidotes, morphine or caffeine may be used with care.

Adulteration

Henbane is sometimes adulterated, although less often than formerly. *Hyoscyamus muticus* L. (Egyptian or Cyprus Henbane) leaves and tops have sometimes been seen admixed with the true Henbane. This is a particularly dangerous adulterant, because this plant is very much richer in alkaloid than our Henbane. Also, other unofficial Henbanes have been used at times to adulterate or sophisticate true Henbane. Also so used have been Stramonium, Belladonna, Mullen and Digitalis. Adulteration is best detected by means of the microscope, since when dried and crumpled, these various leaves have considerable similarity to the unaided eye. Thus, microscopically, Henbane is very readily distinguished from both Belladonna and Stramonium by its much greater coverage of the leaf by trichomes.

Other Hyoscyamus Species

Approximately 20 species of *Hyoscyamus* are recognized. One species, *Hyoscyamus albus*, has already received passing notice. It was used by the ancients for catarrh, cough, *etc.*, and the

natives of southern Europe, where it grows, still sometimes use the plant in much the same manner as we do our medicinal Henbane. They also grow it as an ornamental in flower gardens, and additionally *H. aureus* L., which also is occasionally used as a drug. The root and herb of *H. physaloides* L. was once used in Siberia in place of opium as a

medium of exchange. *H. muticus*, already mentioned as an occasional adulterant of Henbane, is imported into this country in considerable quantities for use in alkaloid manufacture, as is well known. The alkaloid content is roughly 25 times as great as that of "Henbane Niger", as true Henbane is sometimes referred to in commerce.

Utilization Abstracts

Bamboo Pulp. "The future for white paper made of bamboo is bright. Runs made a few months ago were so successful that one concern is contemplating cultivation of bamboo in Texas for commercial use. Only a few of the 123 varieties now being grown in a United States Experimental Station near Savannah, Georgia, have been tested, but further research is now being carried on". (*Pulp and Paper Bulletin*, as reported in *Chemurgic Digest* 5(13): 235. 1946).

Cork Oak in Maryland. Through the cooperation of the Crown Cork and Seal Company of Baltimore and the Maryland Department of State Forests and Parks, experimental plantings of cork oak, *Quercus Suber*, have been made in Maryland. It has been found that the southern counties and the Eastern Shore of the State are suitable for growth of this tree which is native to the western shores of the Mediterranean. It is hoped that this may indicate possible future commercial production of cork in the State, not only as a forest crop but also on farms where the acorns would be of value as hog food.

"For normal peacetime manufacturing requirements in the United States about 160,000 tons of cork are imported annually. Sixty percent of the cork brought to this country is used in the manufacture of cardboard insulation. Other uses of cork include: floats for gauges and fishing nets, life jackets, shoe inner soles, printing press blankets, closure liners, ring buoys, gaskets of many kinds for

automobiles, tractors, trucks, household appliances and industrial equipment, linoleum, cork tile, sporting goods and novelties". (*G. B. Cooke, Chemurgic Digest*, 5(10): 187. 1946).

Charcoal. Charcoal is produced either as the residue from wood distillation operations in large retorts, or by incompletely burning wood under an earth blanket to carbon without any consideration being given to the volatile products driven off. In the north-eastern States there are four main uses of charcoal:

First, in shade-tobacco curing sheds. About 7,500 tons are annually used for this purpose in the Connecticut Valley, some of it in the form of briquets obtained, when available, from the Ford Motor Company in Michigan. These briquets are molded from powdered charcoal with starch or other material as a binder.

Second, as fuel for home cooking by the foreign-born population.

Third, in industrial operations, chiefly brass and other metal industries, where charcoal possesses qualities particularly valuable to the processes.

Fourth, as a purifying agent. Pulverized charcoal, treated to drive off the hydrocarbons, is converted into "activated charcoal" which possesses absorptive qualities as a refining and purifying agent. Water companies use it to remove tastes and odors from drinking water. (*E. L. Heermance, Chemurgic Digest* 5(10): 188. 1946).

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The Pneuma Enthusiastikon: On the Possibility of Hallucinogenic "Vapors" at Delphi and Dodona

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The Pneuma Enthusiastikon:

*On the Possibility of Hallucinogenic
“Vapors” at Delphi and Dodona*

C. SCOTT LITTLETON

The ancient Greeks, as Dodds (1951) so convincingly demonstrated, were as overtly shamanistic in their religious practices as any of their Indo-European-speaking cousins in India or Eastern Europe, to say nothing of Central Asia. The chief manifestations of this shamanism were the famous oracles at Delphi and Dodona, to which both individuals and representatives of city-states came when they needed information on the course of future events, or to find out whether the divinities involved—Apollo and Zeus, respectively—would sanction a projected endeavor. The more famous of the two sites was, of course, Delphi.

DELPHI

Located in the shadow of Mt. Parnassos, high above the north shore of the Gulf of Corinth, the site of Delphi seems to have been a sacred place long before the Indo-European-speaking Greeks arrived on the scene. Indeed, Palmer (1965) has suggested that the name *Parnassos* means “Place of the Temple” in Luvian, and that

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the Greeks simply took over an already ancient religious institution. Palmer's theory about a Luvian substratum is, of course, very much open to question, but whoever the immediate predecessors of the Greeks may have been, they clearly worshipped at this site, and perhaps performed shamanistic rituals there.

In any event, from Mycenaean times onward Delphi seems to have been firmly associated with the god Apollo, the luminescent son of Zeus and Leto who, like most shamanistic figures, was closely associated with healing. Although there are several traditions about how Delphi came to be the site of an oracle, the oldest, contained in the Homeric *Hymn to Apollo* (Evelyn-Smith 1936:345–351, 11. 281–374), describes how the young god, enroute to his future abode, killed Python, a formidable she-dragon who lived at the site (Rose 1959:136). To placate the dragon's spirit (after all, Apollo *was* an interloper,¹ and this may dimly reflect the earliest Greek conquest of the region sometime after 2000 B.C.), the god founded an oracle in her name. Thus, a female shaman known as the Pythia² came to serve as the vehicle or "mouthpiece" through which the god could speak to mortals.

Seated on a tripod—which perhaps symbolized the spiritual ascent of her body when possessed by Apollo—the Pythia performed in what appears to have been an ecstatic state closely resembling those characteristic of shamanic performances observed by anthropologists in contemporary folk and primitive societies (see, for example, Harner 1980; Peters and Price-Williams 1980; Peters 1982). Exactly how this state was achieved is not altogether clear, at least from the ancient eyewitness accounts, and here we arrive at the central focus of this paper.

THE VAPORS

Many ancient sources suggest that "mephitic" (or toxic) vapors of some sort surrounded the Pythia during a mantic (i.e., prophetic) session. Both Strabo and Plutarch, for example, attribute her prophetic ecstasy to the presence of a *pneuma enthusiastikon*, or "inspirational exhalation"; indeed, Plutarch, who was himself a Delphic priest,³ describes the smell as fragrant, "as if the adyton [sanctuary] were sending forth the essences of the sweetest and most expensive perfumes from a spring" (quoted by Fontenrose 1978:198). Iamblichos calls it a fiery *pneuma* that rises from the earth and "envelopes

the Pythia in radiance” (1978:198) while Pliny the Elder refers to an “intoxicating exhalation (*exhalatione temulenti*) which issues from the earth at certain places, of which Delphi is one, and causes oracle-speaking” (1978:198).

These vapors, at once toxic and fragrant—and also seemingly psychotropic—came from a circular hole, about ten centimeters in diameter, in the so-called *omphalos* or “navel” stone on which the tripod rested (see Figures 1 and 2). Thus, a great many commentators, modern as well as ancient, have suggested that there must have been a “chasm” beneath the temple from which the mysterious gases were emitted. Diodoros, the first to mention the presence of such a presumed chasm, suggested that anyone entering it would be imbued with “mantic enthusiasm” (Fontenrose 1978:200), and Pliny observed that “the inebriating exhalations issue from oracular caves (*fatidici specus*)” (1978:200). Farnell (1907:189) suggested that the “divine afflatus,” or vapors, were emitted from a “fissure in the ground,” and assumed that they had a natural source in the local geology.

Although modern geological and archeological research has clearly established that there is no “chasm” beneath Delphi from which any natural vapors could have been emitted (Dodds 1951:73–74; Roux 1976; Fontenrose 1978:202–203), the conclusion that this idea was a “Hellenistic invention” (Dodds 1951:73) or that “there is no reality behind the vapors” (Fontenrose 1978:203) needs to be reconsidered. I have examined the interior surface of the hole in the *omphalos* stone and can attest that it is still partially charred, which would seem to indicate that *some* sort of smoke passed through the vent. Since it is located less than 30 centimeters from the notches into which the legs of the tripod fitted, the smoke (or fumes) would necessarily have surrounded the Pythia as she sat a meter or so almost directly above the hole, and it would have been difficult if not impossible for her to have avoided inhaling them.⁴

Since the existence of a natural source for whatever passed through the stone can be effectively ruled out, I suggest that there must have been an artificial one. Indeed, I am not the first to make this suggestion; over fifty years ago Holland (1933) made a persuasive case for the probability that a fire was lighted in a basement below the adyton (in other words, in the “chasm”) and that its smoke was vented into the *manteion* (prophetic chamber). However, it is the nature of the smoke that concerns us here.

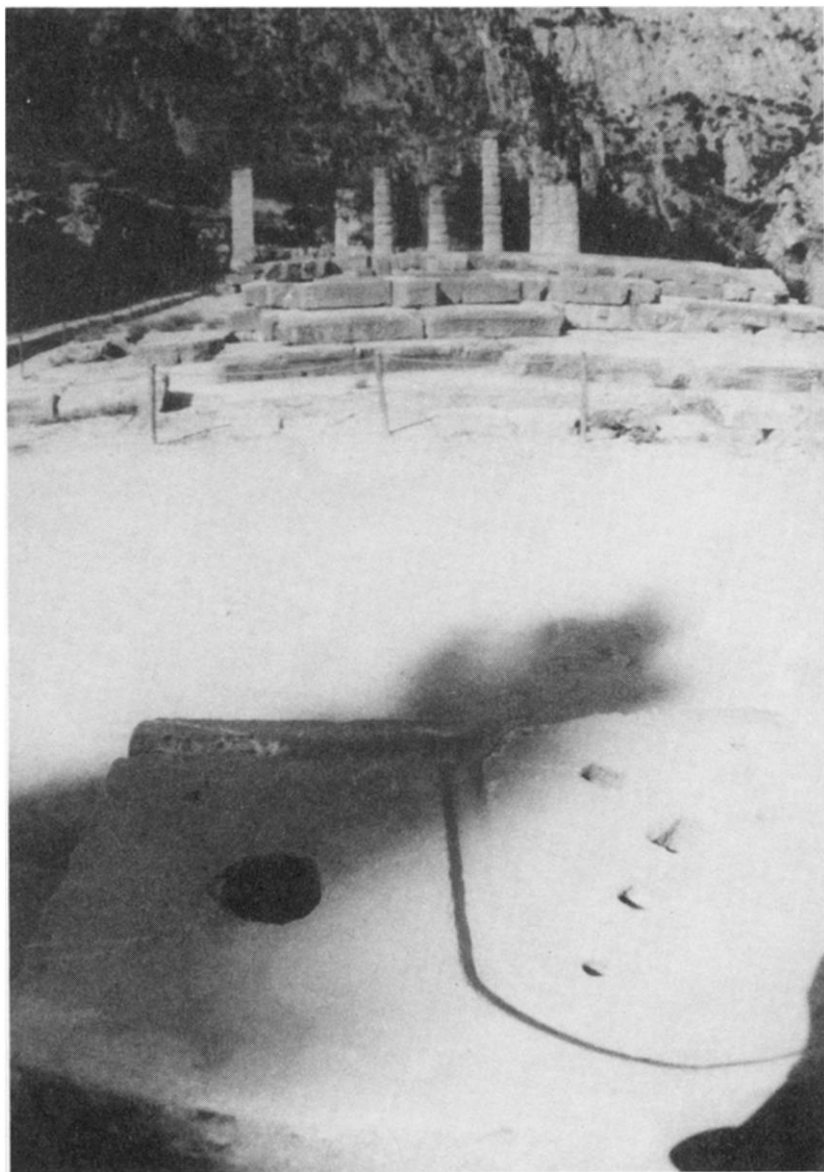


Figure 1. The so-called *omphalos* or “navel” stone in its current location at Delphi with what is left of the Temple of Apollo in the background.

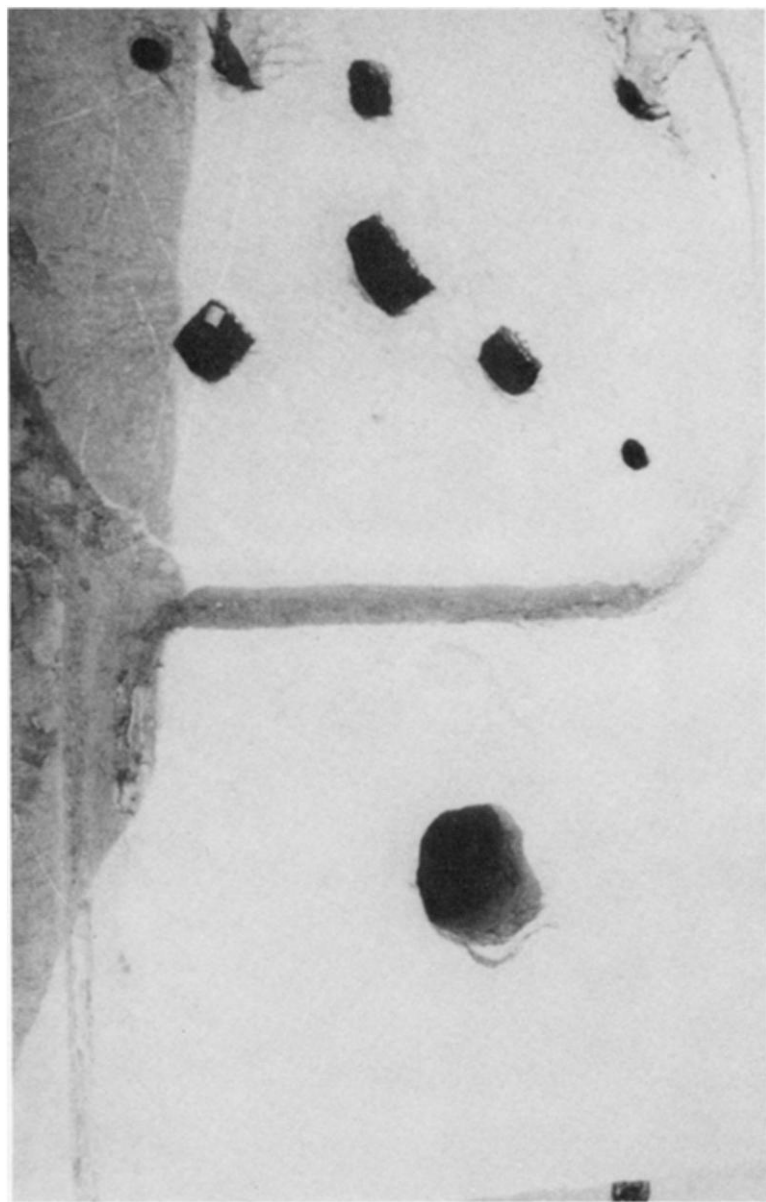


Figure 2. A close-up of the *omphalos* stone showing the rectangular notches in which the legs of the Pythia's tripod seem to have fitted and, to the left, the hole through which the hallucinogenic "vapors" issued.

If Holland's suggestion is correct—there is at present no clear archaeological evidence of such a hearth or furnace beneath the adyton—it can be further suggested that the fire in question was stoked with an hallucinogenic plant or substance, and that the smoke from this hallucinogen was in some measure responsible for the Pythia's ecstatic state. But which hallucinogenic plant, if any, was employed here is difficult to establish with any degree of certainty.

Stefanis, Ballas, and Madianou (1976:305) suggest that the hallucinogen used at Delphi and elsewhere was probably one of the *solanoids*, that is, *Hyoscyamus oblongus* (henbane) or *Datura stramonium* (jimsonweed), or perhaps even *mandragora*. There is also the possibility that the presumed sacred fire beneath the *manteion* was stoked with opium poppies (*Papaver somniferum*), as they too are native to the region; indeed, opium seems to have been the principal component of the drug *nepenthe* (cf. Scott 1969:6–8; Latimer and Goldberg 1981:21–30). However, *Datura stramonium* and the other plants mentioned by Stefanis et al. are typically ingested rather than directly inhaled (cf. Furst 1976:134–145), and opium was more often than not eaten rather than smoked in ancient times (Latimer and Goldberg 1981:23).⁵ The weed dandelion, or *Lolium temulentum*, is also a possibility; it is indigenous to the Aegean region, and its active agent, a fungus located under the seed coat (Renfrew 1973:176–177), can cause “trembling and confusion of sight” if ingested by humans or animals (Georgia 1919:60). However, to the best of my knowledge, the ingestion of *Lolium temulentum* as a psychotropic drug (let alone its inhalation) is nowhere attested in classical antiquity, and its use at Delphi would therefore seem to be improbable.

It is also conceivable that a fungal agent was employed. As Wasson (1968, 1972) has brilliantly demonstrated, *Amanita muscaria*, or the fly-agaric mushroom, was almost certainly the prototype of the Vedic divine hallucinogen *soma*, and that the use of this agent—a substitute for which had to be found in India—is deeply rooted in Siberian/Central Asian shamanism. Indeed, a fungus of some sort was in fact associated with the cult of Apollo at Delos,⁶ and, if Wasson is correct, the hallucinogenic potential of fly-agaric seems to have been widely recognized among the early Indo-Europeans—who, after all, were ultimately linked to the same Siberian/Central Asian tradition (cf., for example, Gimbutas 1970). The fly-agaric was, however, *not* inhaled, but rather ingested, either directly or via the urine of someone who had metabolized it (see Furst 1976:100–101). Yet

another possibility—a rather strong one, in my opinion—is that the hallucinogen contained in the Delphic *pneuma* was *Cannabis sativa*, known as hemp or hashish.

To be sure, *Cannabis* was neither a generally recognized component of the ancient Greek pharmacopœia nor widely noted in classical antiquity for its hallucinogenic effects (Bruner 1973; Benet 1976). However, the plant has been cultivated in Greece for millennia (Abel 1980), and would have been readily available. Moreover, its hallucinogenic potential was almost certainly appreciated in at least a few esoteric circles (Bruner 1973), and, as Delphi was perhaps the most important single religious establishment in Greece, it is highly probable that some members of its priesthood⁷ were privy to the knowledge that *Cannabis sativa* can alter one's state of consciousness—especially in light of the inherently shamanic character of what went on there. Later I will discuss some compelling comparative evidence that reinforces this assumption.

Although ancient eyewitnesses such as Strabo and Pliny were probably too far away from the tripod to have experienced any hallucinogenic effects from the vapors, the Pythia certainly would have, since she would have been immediately enveloped by them. The fire was probably lighted whenever it was necessary for her to go into a trance, perhaps at a secret signal from one of the priests in attendance, who was also far enough away from the tripod to avoid getting “high.” However, the sweetish *smell* would have been pervasive, just as it is when one enters a room where marijuana is being smoked.

It should be emphasized that the foregoing is still highly conjectural, and will remain so until the residue in the *omphalos* stone is chemically analyzed. Several chemist colleagues (via personal communications) have indicated that such an analysis might be possible if a sample of that residue were subjected to state-of-the-art spectrometry, even after 23 centuries (the extant temple dates from the late 4th century B.C.; see Fontenrose 1978:5). I urge that this be undertaken, for if I am correct, it would explain an important aspect of the Delphic ritual, and would settle a controversy that has persisted since antiquity.

As the ancient sources give no hint of a manmade fire beneath the adyton, the whole business must have been a closely guarded secret known only to a handful of senior Delphic priests (Plutarch was either unaware of it or so devoted to Delphi that he refrained from divulging it).⁸ Still, it is curious that in the thousand-odd years that

Delphi flourished (from the 9th century B.C. to A.D. 391, when the Emperor Theodosius closed all of the oracles in the name of Christianity) that no one divulged this secret. It is possible that the practice had been discontinued well before the oracle ceased operation, and might have been forgotten by the time Theodosius's edict went into effect. Indeed, according to Lucan and several other Roman writers, the oracle ceased continuous operation from approximately 50 B.C. on, and had long since lost the prestige it had held from the 6th through the 4th centuries B.C. But even if the "vapors" had lost their hallucinogenic potential by the time Lucan and other skeptics visited Delphi in its twilight years, the residue from the earlier *Cannabis* and other hallucinogenic fumes should still be detectable in the *omphalos* stone, along with that produced by the smoke from burning laurel leaves and/or incense.

That the laurel did play an important part in the Delphic rituals is certain, as the tree was sacred to Apollo. In preparing for a session on the tripod the Pythia would "fumigate" herself with laurel smoke and sometimes chew the leaves. But as Dodds (1951:73) so delightfully phrases it, the eminent German philosopher and pioneer student of hallucinogens T. K. Oesterreich (1966 [1921]) "once chewed a large quantity of laurel leaves in the interests of science, and was disappointed to find himself no more inspired than usual." Perhaps the laurel leaves were laced with *Cannabis*, which would have heightened the hallucinogenic effects of the smoke.

Other preparatory rituals included eating bay leaves (also non-psychotropic) and drinking from a sacred spring, most likely Castalia (Dodds 1951:73). Thus, even before inhaling what I suspect were hallucinogenic "vapors" the Pythia was thoroughly prepared to be possessed by the god, and autosuggestion almost certainly played a large part in her performance, as it does in all shamanic performances. She was probably chosen for her susceptibility to possession, and even if the fumes that surrounded her were nonhallucinogenic, they might well have served to trigger an ecstatic state, in combination with her chewing of equally "harmless" laurel and bay leaves. Indeed, the concept of possession by a *pneuma* was fairly widespread in antiquity; for example, the poet Hesiod claims to have been inspired by a *pneuma* breathed into him by the Muses while he was on Mount Halcyon (cf. *Theogony* l. 31, quoted by Evelyn-White 1936:81), and in the Homeric *Hymn to Demeter* (l. 238, Evelyn-White 1936:307) the goddess is said to have nursed Demo-

phoon by breathing a “vapor” into him. This is a powerful metaphor, and probably served to heighten the sensation of being possessed by a divinity.

Unfortunately, we know relatively little about the exact procedures followed in the *manteion* once the Pythia mounted her tripod. Few ancient sources give any details, especially for the period when the oracle was in its heyday. We do know that the responses were often rendered in verse, and most contemporary scholars have assumed, with Farnell (1907) and Dodds (1951), that the Pythia uttered a series of random words and phrases while in an ecstatic state, and that these were later edited and refined by the Delphic hierarchy and presented to the petitioner as a coherent, albeit often cryptic answer to the question. Fontenrose (1978:228) contends however that “the Pythia spoke directly and coherently to the consultants,” and that no ecstasy or frenzy was involved.⁹ With all due respect to Fontenrose’s expertise on Delphi, I am inclined to accept the more widely held view of the mantic session, especially in light of the fundamentally shamanic character of the institution and the high probability that the Pythia was under the influence of a drug when she performed.

In short, I suggest that Dodds’s (1951:70) assertion that “the god entered into [the Pythia] and used her vocal organs as if they were his own, exactly as the so-called ‘control’ does in modern spirit-mediumship” is probably correct, and that Fontenrose’s attempts to “de-shamanize” Delphi are based on an imperfect understanding of the phenomena involved, and of the extent to which the Pythia’s behavior parallels shamanic performances observed by anthropologists in many other parts of the world.

DODONA

After Delphi, perhaps the most important Greek oracle was at Dodona, a site in northwestern Greece (that is, the Epirus) sacred to Zeus and his consort Dione. The name, which was also associated with several other less famous oracles, most likely derives from a Greek word meaning “goatskin,” the goat being one of Zeus’s sacred animals (Evans 1974:104), although there is no evidence that the goat played a role in the Dodona cult (1974:104).

Unfortunately, we know even less about the mantic procedures at Dodona than we do about those at Delphi. However, there do seem

to have been some differences. For one thing, the oracles were spoken by a group of priestesses, the Peleides, or "Doves" (Evans 1974:120), rather than by a single individual. Also, unlike the procedure at Delphi, the drawing of lots and the interpretation of signs seems to have played a major part in the divinatory process (Fontenrose 1978:229). The most important of these signs was the rustling of the branches of a great oak tree (the personification of Zeus) that grew in the main sanctuary; the name of the group of priestesses seems to be derived from a second sign associated with this tree, the cooing of the doves that lived in its branches (Evans 1974:120).

However, the achievement of a trance state seems to have been as important at Dodona as it was at Delphi, and the "correct" reading of the signs just mentioned was only possible after the Peleides had been possessed by Zeus. Moreover, Dodona also seems to have had hallucinogenic vapors. To be sure, the evidence here is far less extensive than for Delphi, but the fact that at least one early Christian writer, Prudentius, saw fit to rejoice over the news that "lying Dodona has lost its mad vapors" (*Apotheosis* l. 441, quoted by Fontenrose 1978:202) cannot be ignored. Thus, although there is no more geological evidence for the presence of a natural fissure or vent at Dodona than there is at Delphi, it can again be cautiously suggested that smoke from a fire stoked with hallucinogens played an important part in the mantic process, and that the Peleides, like the Pythia, probably inhaled the "mad vapors." And, as at Delphi, the resulting "high" seems to have facilitated their possession by Zeus.

THE SCYTHIAN CONNECTION

As Dodds (1951) points out, the divinatory rituals performed at Delphi and Dodona, as well as at other Apollonian and Zeusian oracles scattered across Greece proper, Asia Minor, southern Italy, and Sicily, were predicated on the *same* shamanic principles that underlie spirit possession everywhere (I. Lewis 1971; Blacker 1975; Bourguignon 1976). The same thing can be said for the Sibylline oracles in Italy. While there is no indication that these other sites made use of hallucinogenic smoke, it may be suggested that hallucinogens in one form or another were regularly used throughout the Greco-Roman world to facilitate the achievement of trance states, especially at oracles. As was pointed out, *Cannabis sativa* is native to the region, and its ingestion (if not direct inhalation) is thoroughly

attested in premodern times (see, for example, Benet 1976); indeed, one thinks immediately of the infamous *Hashishin* or “Assassins” of medieval Syria, who seem to have used the drug to achieve an altered state of consciousness, if not exactly a trance state (Hodgson 1955:133–139; Franzius 1969:47–48).¹⁰ The same can be said for the opium poppy, which also has a long history in the Near East and has been used for countless generations as a medicinal herb as well as a hallucinogen.

Moreover, there is archeological evidence that at least one other ancient people, the North Iranian-speaking Scythians, inhaled hallucinogens in a fashion similar to that suggested for Delphi and Dodona.¹¹ Excavations at Pazyryk and other Scythian sites in the Altai region of western Siberia have revealed a number of small, conical felt tents that stood over copper censers. The presence of hemp seeds clearly indicates that the occupants of these tents were surrounded by narcotic smoke (Artamonov 1965:106). This, of course, brings to mind—and, indeed, confirms—Herodotus’s famous account (4.75) of how these steppe-dwelling barbarians regularly inhaled the smoke produced by burning hemp seeds:

The Scythians then take the seeds of this hemp [used in the manufacture of clothing] and creep under the felt coverings, and then they throw the seeds upon the stones which have been heated red-hot: and it burns like incense and produces a vapour so thick that no vapour-bath in Hellas would surpass it: and the Scythians being delighted with the vapour-bath howl like wolves. [Macaulay 1904:320]

Herodotus goes on to assert that this “vapour-bath” was a substitute for bathing, and associates the accompanying ululation with the mundane pleasure of fumigating the body. However, a much more likely explanation is that these howls were engendered by the ecstatic state produced by the fumes from the burning hemp, which almost certainly included leaves and stalks as well as seeds, and that the practice of inhaling these fumes was thoroughly shamanic in purpose and intent (see, for example, Meuli 1975[1935]:817–824). Moreover, it seems to have been widely distributed among the Scythian tribes, as those Herodotus knew best lived in the region north of the Sea of Azov in what is now southern Russia, that is, about two thousand miles west of Pazyryk.

In any event, on the basis of this evidence, and despite Herodotus’s ignorance of the psychotropic properties of the Scythian “fumigation,” I suggest that the practice of inhaling hemp smoke man-

aged to diffuse from the steppe cultures to Greece—or at least to the Delphic *Hosioi* (see note 7) and their counterparts at Dodona and perhaps elsewhere—at some point well before the middle of the first millennium B.C. Exactly when and how this diffusion occurred is still unclear. We do know that contact between Greece and the North Pontic cultures began early (for example, the legendary Medea seems to have been a Scythian shaman), and that Greek trading colonies had been established at various locations along the north coast of the Black Sea and the Sea of Azov by the beginning of the 7th century B.C. (Olbia, for example, located near the confluence of the Bug and the Dniepr, was a flourishing city before 600 B.C.; see Bury, Cook, and Adcock 1926:105). However, I suspect that the technique in question, surely one of the best-kept secrets of classical antiquity, reached Greece via Thrace (Merlin 1972:70), which was also the source of the Dionysiac cult and other esoteric beliefs and practices.

In sum, whatever its ultimate source—or exact chemical make-up—the *pneuma enthusiastikon* should not be dismissed as a figment of the ancient imagination. Rather, the presence of that curious phenomenon would appear to be an indication that the Pythia and the Peleides, in company with a great many shamans elsewhere, modern as well as ancient, achieved prophetic ecstasy through the use of hallucinogens (see, for example, Harner 1973; Furst 1976; de Rios 1984)—despite the fact that the method by which this was accomplished seems to have remained effectively hidden from lay observers like Strabo and Pliny, and even perhaps from such relative insiders as Plutarch.

NOTES

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¹Apollo appears to have upset the chthonic order by killing the primeval inhabitant of the site, and as a result became polluted (Rose 1959:137). Indeed, several versions of the story specifically mention that he had to undergo purification, either in Crete or at Tempe, and according to a Sicyonian legend, both Apollo and Artemis sought out Aigialeia, whom Homer names as the unfaithful wife of Diomedes, to perform the ritual (Fontenrose 1959:19–20, 57, 199). Thus, the establishment of the oracle was almost certainly an integral part of the god's purification, an act of self-healing that is characteristic of shamanic myths generally (cf. Peters 1982).

²Initially the Pythia seems to have been a young virgin, but after someone Rose (1959:138) calls "an impious wretch" had the audacity to rape one of the early holders of this office, it was decided that an older woman would be preferable. Nevertheless, the Pythia was generally held to be Apollo's "bride," which reinforces the assumption that in founding the oracle the god recognized explicitly the need for a symbiosis between the new and the old, the intrusive and the chthonic. Moreover, a candidate for the position of Pythia underwent a symbolic death and rebirth characteristic of shamanic initiations (cf. Lewis 1971), for as the incarnation of the defeated she-dragon, she had symbolically survived Apollo's arrows to become his alter ego.

³Plutarch's appointment as a Delphic *hierews*, or priest, in A.D. 95 (Howard 1970:5) seems in large measure to have been in recognition of his lifelong devotion to Apollo and his distinguished record of civic achievement both in his native city of Chaeronea, about 20 miles from Delphi, and in Boeotia per se (for example, he served as an archon, as building commissioner, as a Boeotarch, and as a member of the Amphictyonic Council; see Barrow 1967:30–32). He also served as director of the Pythian games on at least one occasion during the reign of the Emperor Hadrian (after A.D. 117). In short, as Barrow (1967:31) points out, Plutarch's commitment to the Oracle and its activities seems to have been profound: "All his life [Plutarch] was anxious that the prestige of Delphi should be restored, and it seems that this passion was aroused from his earliest days; he devoted himself to the purpose with an ardour which secured for him especial recognition."

⁴There is a second, somewhat smaller and irregularly shaped hole located directly under the site of the tripod, between the three notches into which its legs were slotted. This hole, too, seems somewhat fire-blackened. Thus, the hallucinogenic smoke may have been vented from two flues, although it is equally probable that this second hole served the more mundane purpose of anchoring a brace that supported the tripod's legs.

⁵Opium was, of course, inhaled in premodern times, but the most common method of taking it into the system, at least in classical antiquity, was to ingest it. *Nepenthe* was almost certainly eaten or drunk: "And Helen, daughter of Zeus, poured into the wine they were drinking a drug, nepenthes, which gave forgetfulness of evil" (*Odyssey* 4.219–221, quoted by Scott 1969:6).

⁶Yet another plant, aconite, or *Aconitum napellus*, the root of which has mild psychotropic properties (it is occasionally used as a sedative), was associated with the so-called "Lycian Apollo" at Patara in Asia Minor (see Dodds 1951:69–70); however, there is no evidence that it was inhaled.

⁷The Delphic priesthood (the *Delphōn aristēs*, or "Noble Delphians") consisted of two *hierews* and five *Hosioi*, or "Sacred Ones," who attended the immediate needs of the Pythia and were intimately involved in the mantic process (cf. Fontenrose 1978:218–219). All were appointed for life (1978:219).

⁸Plutarch and his fellow *hierews* (a certain Euthydemus; cf. Barrow 1967:31) were entitled—indeed, at least one of them seems to have been obliged—to be present when responses were given, and to serve as *prophētēs*, or "prophet" (that is, as the overall administrator of a mantic session; cf. Fontenrose 1978:218–219), and one would suppose that a person in this position would have had access to the oracle's innermost secrets. However, the position of *hierews* seems to have been in fair measure honorary (see note 3), and, although these two priests obviously had a great deal of prestige, the real power—and perhaps knowledge as well—appears to have been in the hands of the *Hosioi* (see above). The "Sacred Ones" were drawn from certain prominent Delphian families believed to be directly descended from the legendary, Noah-like figure Deukalion, and who we know made secret sacrifices to Dionysos and other gods in the course of their religious duties (cf. Fontenrose 1978:259). It is therefore possible that despite his formal position in the Delphic hierarchy Plutarch did not in fact know precisely how the Pythia's prophetic ecstasy was achieved, or that the "perfumes" he describes issued from hallucinogenic fumes. By the same token, his extreme devotion to Apollo (see note 3) may have precluded any mention of this secret in his otherwise relatively objective accounts of Delphi and what went on there.

⁹My colleague Kenneth J. Atchity has put forward the intriguing suggestion (personal communication) that those who consulted the oracle may frequently have been under the influ-

ence of a "contact high," thanks to the heavy concentration of fumes in the *manteion*, and thought that the Pythia's gibberish was meaningful. However, I suspect that the priests—the *Hosioi*—were careful to keep the petitioners well away from the "vapors," and that they regularly glossed and interpreted what the Pythia had to say.

¹⁰However, B. Lewis (1967:11–12) disputes this contention, suggesting that the label *Hashishin* was simply an "abuse" perpetuated by local Sunnis, and that there is no definitive evidence that this Shi'ite Moslem sect actually used *Cannabis sativa* in its rituals.

¹¹Some years ago, Nyberg (1938) proposed that the ancient Iranian prophet Zarathustra was in fact a shaman who achieved trancelike states by inhaling hemp fumes. Thus the trait in question may have been pan-Iranian. Moreover, as Jaan Puhvel points out (personal communication, 1984), the date suggested by Nyberg for Zarathustra (ca. the 10th century B.C.) would be contemporary with the earliest phase at Delphi. Nyberg's theory, however, has been called into question by later scholars (see, for example, Herzfeld 1947; Henning 1951), and is not based on any surviving physical evidence.

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Lettuce and the Sycomore: Sex and Romance in Ancient Egypt¹

JACK R. HARLAN²

In ancient Egypt, lettuce was considered an aphrodisiac and was featured in the yearly festival of Min, an ithyphallic god of fertility and procreation. The Greeks considered it an antiaphrodisiac and its use as a soporific continued into this century. The sycomore fig has a highly specialized fertilization biology, but does not produce seed in Egypt for want of the proper species of wasp. Ripening has been hastened since ancient times by gashing the syconia. To the ancient Egyptians it was a sacred trysting tree inhabited by the goddess of love and was the focus of a body of love poetry. Some selected verses are presented.

The Crop Evolution Laboratory at the University of Illinois has traced the origins and evolution of a number of crops, mostly cereals and legumes, back into the mists of prehistory. This inquiry is set almost entirely in the historical time range and deals as much with human perceptions as with biological evolution. It actually began with a field trip of my class on "Crops and Man" to the Field Museum of Natural History in Chicago. That year, a new exhibit had opened with a reconstructed Egyptian tomb (the original stones moved many years ago from Egypt to Chicago) and a hand-painted copy of murals from Nacht's tomb. Among the offerings shown in Nacht's tomb is a strange plant consisting of a short stalk with leaf scars and blue, pointed leaves, said by some scholars to be lettuce (Fig. 1). Blue lettuce? Leaves linear attenuate? Other paintings showed the plant to be as tall as a man including an ostrich plume headdress (Fig. 2). This is lettuce? My curiosity was aroused and the hunt was on. What follows is an abbreviated sketch of the results. The investigations into the sycomore came in part from observing the processing of tomatoes in south Florida where I used to go to pollinate a winter nursery. Is the connection obvious? Read on!

LETTUCE (SEX)

The first step was to find out what other people thought the plant was. The results of an incomplete survey are shown in Table 1. One may conclude that opinions of scholars on the subject are of little help. I have, however, considerable confidence in Schweinfurth as a botanist, and if he thought the plant was lettuce, one should pay attention. Schweinfurth did not set forth his argument in print, but Keimer (1924a) produced a very convincing one which was elaborated elegantly by Gauthier (1931). To understand the argument one must follow mural chronology in some detail and trace the stylization that takes place over time.

The plant is shown in 12th dynasty tombs at Beni Hasan (Newberry, 1893) as a garden plant (Fig. 3). Here we see a sketch of pot irrigation: one man carrying

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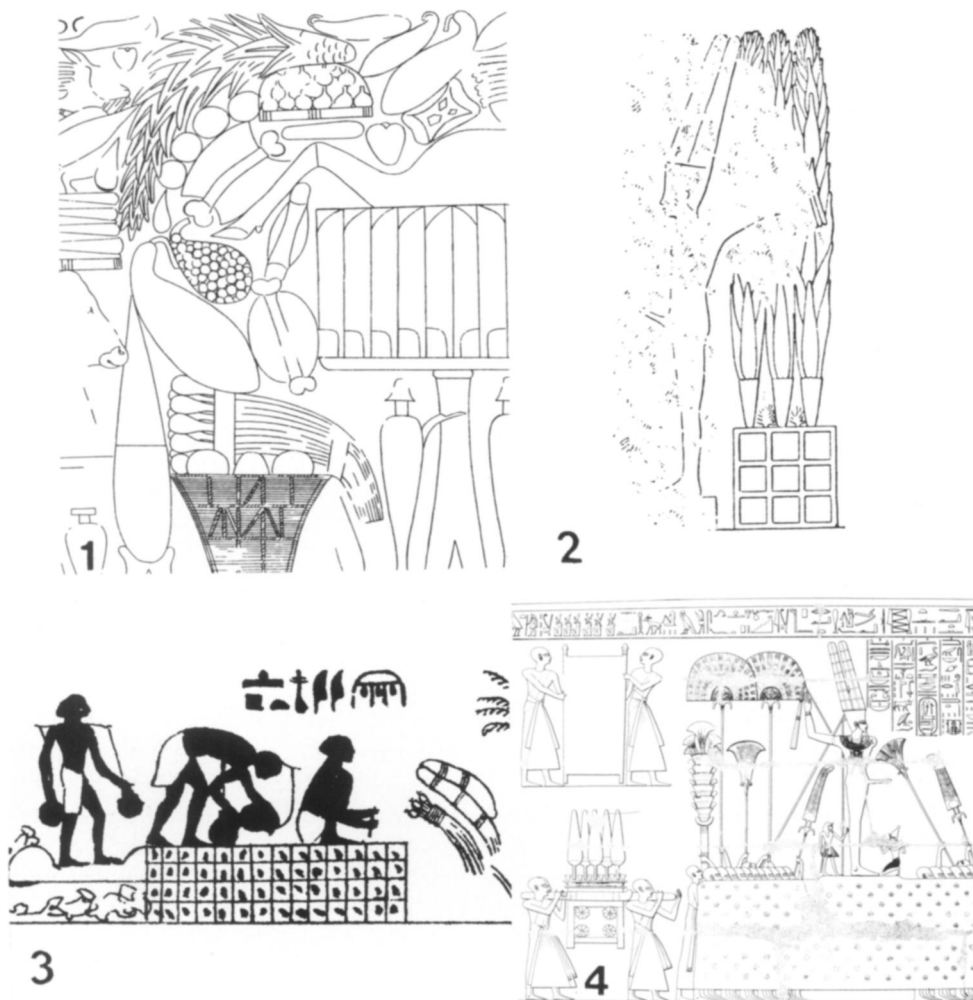


Fig. 1–4. Fig. 1. Offerings in rock tomb of Meir, Chapel B, No. 2 (Blackman, 1915, vol. 2, plate X). The plant at the top with pointed leaves and stem with leaf scars is lettuce. Fig. 2. The fertility god Min with erect lettuce behind him and erect phallus before. The stylized lettuce stands on stylized checkerboard representation of a garden. From Koptos (Keimer, 1924a, p. 142). Fig. 3. Garden scene showing pot irrigation and garden produce, lettuce and leeks, Beni Hasan, tomb 3 (Newberry, 1893, plate 29). Fig. 4. Part of festival of Min with men carrying erect lettuce plants on platform with stylized representation of checkerboard garden. They follow the statue of Min in the procession. University of Chicago, Medinet Habu, vol. 4, plate 201.

two filled pots on a pole across his shoulders, a second dumping his pots onto a checkerboard garden, another tending the garden either weeding or transplanting, and a bunch of the produce, shown above, right. The checkerboard represents planted areas surrounded by low ridges or bunds to hold the water and let it soak in. This system is in common use all over the Near East today, including Egypt. The checkerboard garden symbol follows the lettuce as both become more and more stylized. By the 18th dynasty both have become so stylized as to be hardly

TABLE 1. IDENTIFICATIONS OF "THE PLANT" SHOWN ON EGYPTIAN MURALS.

Trees in general: Lanzone (1885/6, reprinted 1974); Müller (1906); Reinach (1910); Tiele (1882); Wilkinson (1837); also Jéquier and Jollois and Devillier cited in Gauthier (1931).
Trees specific: Drexler (in Roscher 1884/86) cypress; Evans (1901) cypress; Gayet (in Gauthier, 1931) <i>Mimusops</i> ; Meyer (1909) cypress; Petrie (in Gauthier, 1931) palm spathe; Rochemonteix (in Gauthier, 1931) sycamore; Saint-Clair (in Gauthier, 1931) <i>Ficus</i> .
Others: Daressy (1900) lettuce; Foucart (in Gauthier, 1931) sorghum; Gauthier (1931) lettuce; Keimer (1924a) lettuce; Loret (1892) lettuce; Newberry (1893) flax; Rosellini (1832–44) radish, palm heart; Schweinfurth (in Keimer, 1924a) lettuce; Unger (in Gauthier, 1931) artichoke; Wilkinson (1854) lotus; Woenig (1886) beet, artichoke.

recognizable if the evolution of the symbols has not been followed (Gauthier, 1931; Darby et al., 1977).

Space and cost make it impossible to reproduce the whole story in figures but it is well developed by Keimer (1924a) and Gauthier (1931). In other murals, "the plant" is shown in checkerboard context being harvested with a digging stick or a sickle, effectively ruling out the tree theories.

Most important, however, is the association of lettuce with the god Min (later confounded with Amon). Min was a popular god in vogue from the Old Kingdom into Hellenistic times. He had a nome devoted to him, a number of temples consecrated to him, and was lord of the desert, the lightning, and the sandstorm. More importantly, he was a god of fertility and procreation. He is shown in a variety of configurations, but the main features of his representations are: an ostrich feather headdress, a scourge or flagellum, signifying power, a checkerboard stand or an offering stand with tall, erect lettuce plants behind him and an erect phallus before him (Bleeker, 1956). The god is depicted many times on temple or tomb walls, but if you have seen one Min, you have pretty well seen them all. The lettuce plants behind him, however, are shown in a great variety of treatments causing no end of confusion for scholars over the years.

There was a yearly harvest festival devoted to Min, usually in the first month of summer by the Egyptian calendar. The ceremony is depicted in detail on buildings constructed for Ramses II, Ramses III, Herihor, Seti I, Amenhotep III, Sosestris, and Thutmose III (Univ. Chicago, 1940). That of Ramses III is the most complete, but where sections have been defaced, extrapolations can be made from the other reliefs (Univ. Chicago, 1940, vol. IV, plates 193–249). The ceremony involves the following six episodes each showing the king in exaggerated size compared to his subjects.

1. The king sets out in procession carried in a sort of palanquin, preceded and followed by a retinue of priests, singers, dancers, and functionaries of various kinds.

2. He arrives at the temple that houses a statue of Min and performs a rite, presenting offerings and pouring out a libation on them. At this point Min is his usual ithyphallic self but does not have the lettuces behind him. Instead there is a symbol suggesting a round African house and bovid horns.

3. The procession leaves the temple carrying the statue of Min with additional dignitaries, musicians, and participants in public parade. A white bull precedes them, and retainers carry erect lettuces on a platform with checkerboard ornamentation behind the statue.

4. Four birds are released to fly to the four cardinal points of the earth, presumably to carry news of the celebration.



5. The king ceremonially cuts a sheaf of emmer wheat with a sickle symbolic of the harvest now beginning, and the bull is sacrificed.

6. Min is returned to his place in the temple; the king performs another rite of consecration, and this time Min has lettuces behind him.

Other participants include the queen, in the case of Ramses III without a name in her cartouche, and a black "priest." Min, himself, is sometimes shown black, suggesting along with the African house and horns that the ceremony may have originated in Black Africa, although lettuce is not a plant of tropical Africa.

Parading an image of a god in solemn procession was common in Egyptian religious celebrations. Sometimes the statues were made of stone and enormously heavy. This posed no great problem for the Egyptians; they mounted heavy stones on sledges and minimized friction with Nile mud. The procedure is shown a number of times on mural reliefs (Fig. 5). Often, only a few men were required to move a stone many tons in weight. The key to the operation is a little felahin with a jug of water making mud for the sledge to skid over (Fig. 5) (Montet, 1964).

The form of the lettuce shown on ancient Egyptian walls, is, of course, very different from what we can buy at the supermarket today. Plant breeders, both ancient and modern, have brought about great changes from the wild *Lactuca scariola* L. (or *L. serriola* Torner). The wild form is erect, the leaves are blueish with spiny leaves, the seeds shatter at maturity, and the plant is suffused with latex and very bitter (Helm, 1954). As Ryder and Whitaker (1976, p. 39) point out "The emphasis of early human selection must have been on non-shattering seedheads, absence of early flowering (bolting), non-spininess, decrease in latex content and increase in seed size, as well as on the hearting character." Lettuce was grown by the Egyptians for its oil, and lettuce seed oil was a fairly important commodity earlier in this century (Bonaparte, 1901; Milad, 1920). The oil varieties are still grown to some extent, but are bitter and not eaten as vegetables. Keimer (1924b) figures an Egyptian cultivar grown in the Botanical Garden at Berlin-Dahlem 1.5 m high and with appressed strap-like leaves. The Chinese selected lettuce for its stalk; the stem lettuce has reduced leaves but a stem up to 1 m in length (Herklots, 1972).

The Greeks associated Min with Pan because they were both ithyphallic gods, but they were certainly not equivalent. It would be unfair and inaccurate to interpret ithyphally as some sort of pornography. The symbolism is much too profound for that. We are dealing with the divine source of all life, a celebration of our very existence and all that is good and beautiful. As Gauthier (1931, p. 138) pointed out, the sign  (*nefer*), or  for emphasis, can mean "phallus" as well as beauty, pride, glory, strength, vigor, good, happy, excellent, etc. According to Diodorus Siculus (1933, IV, 6) there is a connection between Min and the origin of agriculture and the consequent rise of civilization. It was Isis who taught men how to cultivate wheat and barley and her husband/brother Osiris who forbade men from butchering and eating one another and taught them to live by civilized law. The Titans conspired against Osiris, killed him and dismembered the corpse. Isis tracked down the murderers, slew them and brought the pieces of the body together—all except the phallus that the Titans had thrown into the river. Isis presented the body of Osiris to the priests with the instructions that an

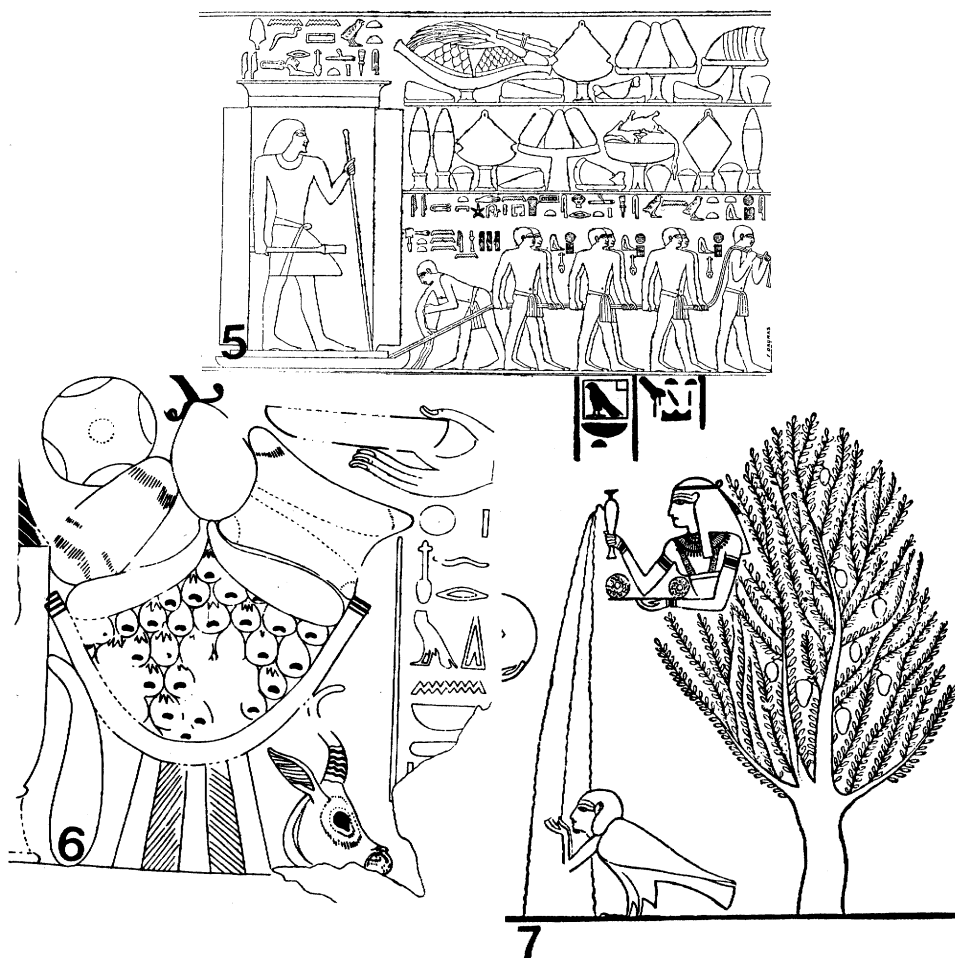


Fig. 5-7. Fig. 5. Moving heavy stone statue, tomb of Ti, corridor II, east (Montet, 1925, fig. 48, p. 388). The key to easy transport is the small figure in front pouring water to keep the mud pathway slippery. Note bunch of lettuce in upper register. Fig. 6. Offering stand with gashed sycomore "fruits" (Davies, 1913, plate 26). Fig. 7. Goddess of the sycomore pouring libation. She helps to arrange rendezvous with lovers (Wilkinson, 1883, vol. 3, plate 28, p. 118).

erect phallus be added and that he be worshiped as a god. Diodorus also stated (I, 88) that "... not only the Egyptians but not a few other peoples as well have in the rites they observe treated that male member as sacred on the ground that it is the cause of the generation of all creatures."

The association of lettuce with Min was not fortuitous; the Egyptians thought that lettuce was an aphrodisiac. Unlikely as it seems, it was firmly believed, and even today it is thought that one will have many children if one eats a lot of lettuce. Before you buy all the lettuce in Salinas Valley, let me give you the Greek version. They thought lettuce was an antiaphrodisiac. Athenaeus (1957) cites Amphis: "It was among the lettuce-plants, plague take them! Why, if a man not yet sixty should eat them when he desires commerce with a woman, he might twist and turn the whole night long without once accomplishing his desires, wring-

ing his hands against stern fate instead of acting like a man.” He cited others who claimed lettuce produces impotence (Athenaeus, 1957, II, 69). Augustus, the first Roman emperor, dedicated a statue to his physician, Antonius Musa, for curing him of being an hypochondriac, using lettuce as the treatment (Scotti, 1872; Pliny, n.h. XIX, 38; Leclerc, 1941).

The following quote from Pliny (n.h., XIX, 38) reveals a good deal about lettuce of the ancients:

The Greeks have distinguished three kinds of lettuce, one with so broad a stalk that it is said that the wicket-gates of kitchen gardens are often made of them; these plants have leaves rather larger than those of the green garden-lettuce, and extremely narrow, the nutriment being apparently used up elsewhere; the second kind has a round stalk, and the third is a squat-growing plant called the Spartan lettuce. . . . , while the worst kind of all has been given the name in Greek of bitter lettuce, in condemnation of its bitter taste. There is moreover another variety of white lettuce the Greek name for which is poppy-lettuce, from its abundance of juice with a soporific property, although all the lettuces are believed to bring sleep; this was the only kind of lettuce in Italy in early times, which accounts for the Latin name for lettuce, derived from the Latin for milk. A purple lettuce with a vary large root is called Caecilius's lettuce, while a round one with a very small root and broad leaves is called in Greek the antiaphrodisiac, or otherwise the eunuch's lettuce, because this kind is an extremely potent check to amorous propensities”

Here we find a rather good description of the tall, narrow leaved lettuce of the Egyptians, the bitter wild-type, and one especially potent as an antiaphrodisiac. Pliny specifies that the garden lettuce is green, implying that the tall kind is of another hue (blue?). According to Leclerc (1941), the “bitter herbs” of the Old Testament is translated in the Greek Septuagint as “wild lettuce.” But, how can the innocent, innocuous lettuce be a potent aphrodisiac to some and a potent antiaphrodisiac to others? The key is in the Latin name, *Lactuca*; the plant lactates by bleeding latex when broken or injured. The milky juice reminded the Egyptians of semen and, therefore, of fertility, procreation, and aphrodisiacal properties. The same juice reminded the Greeks of latex from the opium poppy that is soporific in nature and has the opposite effect. This also shows that people believe exactly what they want to believe.

Having worked my way through the stylized depictions of lettuce and its check-board gardens, the festivals of Min and the Greek antithesis, I rather thought the matter could rest in antiquity. Not so. There was a 19th century revival of interest in the medicinal properties of lettuce that is worthy of note.

It happens that this new interest in lettuce juice can be attributed to an American doctor in Philadelphia and a Scottish doctor in Edinburgh (Wood, 1868). The first, John Redman Coxe, published a paper in the Transactions of the American Philosophical Society (1799) with the remarkably pompous title: “Inquiry into the comparative effects of the *Opium Officinarum*, extracted from the *Papaver somniferum* or white poppy of Linnaeus; and of that procured from the *Lactuca sativa* or common cultivated lettuce of the same author.” In a masterpiece of self-deception, he convinced himself that lettuce juice had about the same properties as opium extract and was a lot cheaper and more available. The Scot, Dr. Andrew Duncan (1810) came to somewhat similar conclusions, described his method of extraction and coined the term “lactucarium” for the product.

Lactucarium soon became a standard item in the pharmacopoeia on both sides of the Atlantic. A small industry grew up, especially in France and Germany to

supply the commodity. Lettuce was allowed to bolt and the stalk repeatedly cut to collect the latex almost as if it were a *Hevea* rubber tree. Details are given in Kraemer (1907). Aubergier (1842) tested several species of *Lactuca* and found *L. altissima* to be remarkably productive of latex. The stems could reach 3 m in height and 4 cm in diameter. Pereira (1853), Husemann et al. (1884), and Kraemer (1907), among others, analyzed the product chemically without finding much except some weak organic acids and a little (very little) protein. Dr. Coxe published *The American Dispensatory* for many years, and as late as 1831 in the 9th edition resented the fact that Dr. Duncan had never given him credit for his “*anterior* remarks in the American Philosophical Society’s Transactions” (Coxe, 1831, p. 430).

The use of *Lactuca* latex died slowly. Wissowa and Kroll (1925) commented: “Heute ist dieser eingetrocknete Saft (lactucarium) nicht mehr gebräuchlich.” But Vignes (1932) as late as the 1930s reported considerable success in treating a variety of female disorders with lettuce extracts, but said that they should not be compared to opium, but rather to belladonna!

Although Coxe never referred to the ancients, it is hardly possible that he was not aware of them. The Greek herbal of Dioscorides was Englished by John Goodyear in 1655 and must have been well known to every Western medical man of the 18th century (Gunther, 1934). There it is stated about wild lettuce: “It is somewhat in virtue like unto the Poppy—[and it]—doth avert wanton dreams and veneries.”

Actually, the Greek version had never disappeared completely. Leclerc (1874) translated an Arabic medicinal treatise of the early 18th century in which the therapeutic properties of lettuce are described. Chomel (1782) claimed extracts of lettuce have soporific properties. Linnaeus, himself, was so convinced of the antiaphrodisiac qualities that he cited the case of a rich Englishman who very much wanted children. “He was told by his physician that the only way he could have children was to stop his use of lettuce which he very much abused” (Scotti, 1872).

SYCOMORE (ROMANCE)

The plant in question is the sycamore fig (*Ficus sycomorus* L.), not the American plane tree. The name derives from the Greek *Sykon* = fig and *Moro* = mulberry. The “fruit” of a fig is a syconium. Botanically, the true fruits are the drupelets that lodge between the teeth. It is said that in ancient Attica the export of figs was made illegal so that the local population could enjoy the entire crop. Such a law inevitably invited fig smugglers, and smuggling invites informers. A sycophant is one who tattles on fig smugglers.

Most figs are pollinated by wasps and the coevolution of wasp and fig is one of the most fascinating of biological phenomena. The common fig of commerce (*F. carica* L.) is usually pollinated by species of *Blastophaga*, although some cultivars are parthenocarpic and do not require pollination for fruit development. The process of caprification was well known from ancient times and was well described by Aristotle (Hist. Anim., V, 32:26). The females hatch in the wild-type caprifig, emerge from the syconium covered with pollen, fly to young syconia of the proper stage and force their way through the orifice. They lose their wings

and often parts of their antennae and foot segments in the process. They can deposit eggs in short-styled flowers only, but find upon entry into a syconium of a domesticated fig that man has played a cruel hoax on them. Man has selected cultivars with long-styled flowers only. The female wasp searches frantically for suitable places to deposit her eggs and pollinates the fig in the process. She soon dies without completing the life cycle which can only be done in the short-styled flowers of the caprifig (Eisen, 1901). The wasp has a natural preference for the caprifig so the process of caprification usually involves growing the wild-type separately and tying strings of caprifigs in the branches of the domesticated kind. The wasp then has no choice but to accept the cultivar with its long-styled flowers.

The pollination of the sycomore is more complex and remarkably elegant from an evolutionary point of view. The *Ceratosolen arabicus* males emerge from their galls inside the syconium before the females. They walk over to female galls and chew a hole through which they can insert the abdomen and fertilize the females while they are still in their galls. Each male fertilizes several females. Then, the males go to the distal end of the syconium where the male flowers are located and start cutting anthers. The females emerge and go to the cut anthers, open them, take out the pollen and stuff it into highly specialized pockets in the thorax. The males chew tunnels near the ostiole for the females to escape. The females leave, loaded with pollen, and the males die having performed their essential functions. The females find another syconium at the right stage, enter and deposit eggs in short-styled flowers while pollinating the long-styled ones (Wiebes, 1977). They actually take pollen out of the pollen pockets and apply it to the stigmas (Galil and Eisikowitch, 1969). The females die having completed their functions. Another species, *C. galili* has pollen pockets but does not fill them (Galil and Eisikowitch, 1969). What sort of selection advantage would induce the evolution of pollen pockets?

But in Egypt, elsewhere in North Africa, the Levant and Cyprus, the sycomore does not produce seed and all reproduction is man-assisted. In this region, the sycomore has wasps but they are the wrong species. *Sycophaga sycomori* L. behaves rather like the *Blastophaga* of the common fig but does not transport pollen. In fact, the wasps leave the syconium before the male flowers open (Galil, 1968). Shortly after eggs are laid in short-styled flowers and larvae begin to develop in the galls, another wasp, *Apocrypta longitarsus* Mayr lays its eggs in the same galls reaching them from outside the syconium with a very long, sensitive ovipositor. It is incapable of causing galls and never deposits an egg except in a gall already started by *S. sycomori*. The larvae of *Apocrypta* grow faster and cause the larvae of *S. sycomori* to die. It is a kind of parasitism something like that of cuckoos (Galil, 1967). From southern Sudan and Ethiopia southward, the pollinator wasps are present and seeds are produced.

The sycomore in Egypt does not produce seed but does produce a lot of wasp larvae. The ancients developed a technique to hasten ripening so that the fruit could be eaten before it was full of grubs. Theophrastus (h. p. IV, 1) wrote of the sycomore: "It cannot ripen unless it is scraped; but they scrape it with iron 'claws'; the fruits thus scraped ripen in four days." The prophet Amos was a professional fig scraper (Amos 7:14). The Hebrew word used is more accurately translated as "piercer" or "cutter" than scraper (Keimer, 1927). Henslow (1892), Keimer (1928) and Galil (1968) show figures of special knives used for the purpose in Egypt

where the practice of injuring the syconia to hasten ripening is still used. Careful examination of ancient Egyptian reliefs and paintings permits a distinction between common figs in the offerings and sycomore figs. The sycomores are always represented with a gash in each "fruit." Galil (1968) reported that after the syconium is cut it will grown grow very quickly increasing seven fold in size in 3–4 days.

The ancient practice of fig gashing is based on release of ethylene by injured fruit. Tomatoes are ripened artificially in Florida on a commercial scale by a similar procedure. In order to get uniform results, the fruits are picked gourd-green and if any should show signs of turning red, they are taken out on the sorting belts and treated separately. After washing and grading, the tomatoes are put in cartons and stacked in ripening chambers. Each chamber, in one of the plants I visited, held enough cartons to fill three huge semitrailer trucks. One liter of ethylene gas was sufficient for 12 h of ripening in each chamber. In Galil's experiments with sycomores, he found that one gashed fruit would ripen a plastic bag full of uninjured fruits (Galil, 1968).

As to the romance I promised, the sycomore was a sacred tree to the Egyptians and was inhabited by Hathor, the goddess of love (Keimer, 1929). To this day, an Egyptian woman with marital problems may linger under a sycomore in the hope that the spirit of the tree might render assistance (Brown and Walsingham, 1917). More specifically, the sycomore was a trysting tree; it was a place where lovers met. The tree has deep roots and can be found in the bottoms of dry washes at the edge of the desert, well isolated and secluded. As described by Maspero (1903, vol. 1, p. 39), "Its rounded masses of compact foliage are so wide-spreading that a single tree in the distance may give the impression of several grouped together; and its shade is dense, and impenetrable to the sun." The sycomore not only provided cool, deep shade and seclusion but actively participated in lovers' *rendezvous*. The tree can speak and conspire, as we can see in some selections (arranged by the author) from Egyptian love poetry (Kaster, 1968; Gothein, 1928).

GIRL:

Hurriedly scampers my heart when I recall my love of you—
It does not allow me to go about like other mortals—
It seems to have been uprooted from its place.
It doesn't even let me put on my tunic or even take my fan—
I am not able to paint my eyes or anoint myself with perfume,
"Don't linger thus! Get back to yourself!"

I say when I think of him.
'Don't cause me silly pain, O my heart
Why do you play the madman?
Just sit cool and he'll come to you and everyone will see!
Let not people say of me
'There's a girl fallen hopelessly in love!'
Stand firm when you think of him,
O my heart! don't bound about so!"

BOY:

Seven days I have not seen my sweetheart
A sickness has crept into me; my limbs have become heavy and my body does not know itself.
Even should the master physicans come to me, my heart would not be soothed by their remedies.

As for the magician-priests, there is no resource in them; my illness cannot be diagnosed.
 But say to me "Here she is!"—that will make me live again!
 Her name is what will revive me; the coming and going of her messengers is what will give life to
 my heart.
 She is better for me than a whole pharmacy!
 For me her coming would be the Sound Eye of Horus!
 When I see her I am well; when she opens her eyes, my limbs are young again;
 When she speaks, then I am strong; when I embrace her, she banishes evil from me.
 But, I have not seen her for seven days!

THE SYCOMORE:

O! little sycomore, which she planted with her own hand,
 She moves her lips to speak. How fair are her lovely branches!
 She is laden with fruits that are redder than jasper,
 Her shade is cool, she lays a little letter in a girl's hand.
 The head gardener's daughter; she bids her hasten to her lover:
 "Come and stay among my maidens, we are drunken if we would go to thee,
 Ah, before we have tasted anything, the servants who obey thee
 Are coming with their vessels; beer of every kind they bring
 And every kind of bread, many flowers of today and yesterday
 And all refreshing fruits. Come and make it fine today, [and]
 Tomorrow and next day, three days long—Sit in my shade!"
 Her friend sits on her right hand; she makes him drunk
 And yields to what he wishes—
 But I am dumb, and say not what I see;
 I will not say a word!

GIRL:

My god, my lover, my husband—
 How sweet it is to go down to the lotus pond and do as you desire—
 to plunge into the waters, and bathe before you—
 to let you see my beauty in my tunic of sheerest royal linen,
 all wet and clinging and perfumed with balsam!
 I go down into the water to be with you
 and come up again to you with a red fish
 lying so fine and splendid within my fingers
 and place it upon my breast—
 O, sweetheart! look and see!

BOY:

I see my sweetheart coming—
 My heart is in joy, and my arms are opened wide to embrace her;
 And my heart rejoices within me without ceasing
 Come to me, O my mistress!
 When I embrace her and her arms enlace me,
 it is as if I were in the Land of the Gods [Punt] drenched in her fragrance!
 When I kiss her with her lips parted Ah, then I am drunk without beer!

GIRL:

Is there anything sweeter than this hour?
 for I am with you, and you lift up my heart—
 for is there not embracing and fondling when you visit me
 and we give ourselves up to delights?
 If you wish to caress my thigh, then I will offer you my breast also—
 it won't push you away!

Would you leave because you are hungry?
 —are you such a man of your belly?
 Would you leave because you need something to wear?
 —I have a chestfull of fine linen!
 Would you leave because you wish something to drink?
 —Here take my breasts! They are full to overflowing and all for you!
 Glorious is the day of our embracing;
 I treasure it a hundred thousand millions!

It is not possible to read Egyptian love poetry and still think of the ancient Egyptians as stiff little figures walking across the tomb walls. They were *real, live*, flesh and blood people who *celebrated* sex and romance.

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INTRODUCTION OF TOBACCO INTO EUROPE

BY
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ANTHROPOLOGY
LEAFLET 19

FIELD MUSEUM OF NATURAL HISTORY
CHICAGO
1924

The Anthropological Leaflets of Field Museum are designed to give brief, non-technical accounts of some of the more interesting beliefs, habits and customs of the races whose life is illustrated in the Museum's exhibits.

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D. C. DAVIES
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FIELD MUSEUM OF NATURAL HISTORY
CHICAGO, U. S. A.

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DEPARTMENT OF ANTHROPOLOGY

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LEAFLET

NUMBER 19

The Introduction of Tobacco into Europe

In the four preceding leaflets the history and use of tobacco in the two Americas, in Melanesia, and in Asia have been briefly discussed. It may therefore not be amiss to close this series with a review of the early history of tobacco in Europe, particularly in England,—a subject of general interest.

The white man learned the use of tobacco from the aborigines of America soon after the discovery, and the European colonists who flocked to America rapidly adopted the habit of smoking. Las Casas was already compelled to admit that the Spaniards on Cuba who had contracted the habit could not be weaned from it. Lescarbot applies a similar remark to the French of Canada. "Our Frenchmen who visited the savages are for the most part infatuated with this intoxication of petun [tobacco], so much so that they cannot dispense with it, no more than with eating and drinking, and they spend good money on this, for the good petun which comes from Brazil sometimes costs a dollar (*écu*) the pound." John Hawkins observed in 1564 that the French in Florida used tobacco for the same purposes as the natives. A. Thevet, who visited Brazil in 1555-56, noticed the Christians living there as "marvelously eager for this herb and perfume." Gabriel Soares de Souza (*Noticia do Brazil*, written in 1587), a Portuguese farmer, who lived in Brazil for seventeen years from about 1570, informs us that tobacco leaves were much esteemed by the

Indians, Negroes (whom he calls Mamelucos), and Portuguese, who "drank" the smoke by placing together many leaves wrapped in a palm-leaf; they used, accordingly, the cigar. The unknown author of the "Treatise of Brazil," written in 1601 and published by Purchas, also describes the mode of cigar-smoking in Brazil and winds up by saying, "The women also doe drinke it, but they are such as are old and sickly, for it is verie medicinable unto them, especially for the cough, the head-ache, and the disease of the stomacke, and hence come a great manie of the Portugals to drinke it, and have taken it for a vice or for idlenesse, imitating the Indians to spend daies and nights about it."

The English colonists in Virginia did not hesitate to appropriate the aboriginal custom of pipe-smoking. Thomas Hariot (A Brief and True Report of the New Found Land of Virginia, 1588) dwells with enthusiasm on the virtues of the herb, "which is sowed a part by it selfe and is called by the inhabitants *uppówoc*: In the West Indies it hath divers names, according to the severall places and countries where it groweth and is used: The Spaniards generally call it *Tobacco*." He concludes, "We our selves during the time we were there used to suck it after their maner, as also since our returne, and have found manie rare and wonderful experiments of the vertues thereof; of which the relation would require a volume by it selfe: the use of it by so manie of late, men and women of great calling as else, and some learned Phisitions also, is sufficient witnes." "Sucking it after their maner" means pipe-smoking which Hariot himself describes as follows: "The leaves thereof being dried and brought into powder: they use to take the fume or smoke thereof by sucking it through pipes made of claie into their stomacke and heade."

The following passages show that the English settlers soon proceeded to make their own pipes. George Waymouth, who visited Virginia in 1605, has the following notice: "They gave us the best welcome they could, spreading deere skins for us to sit on the ground by their fire, and gave us of their tobacco in our pipes, which was most excellent, and so generally commended of us all to be as good as any we ever tooke, being the simple leafe without any composition, very strong and of a pleasant sweete taste: they gave us some to carry to our captaine, whom they called our Bashabe, neither did they require any thing for it; but we would receive nothing from them without remuneration." George Percy, who visited southern Virginia in 1606, describes an entertainment given in his honor by the savages. "After we were well satisfied they gave us of their tabacco, which they tooke in a pipe made artificially of earth as ours are, but far bigger, with the bowle fashioned together with a piece of fine copper."

INTRODUCTION AND EARLY CULTIVATION OF TOBACCO IN ENGLAND

The four Atlantic states—England, France, Portugal, and Spain—received tobacco directly from America. The subject, as far as England is concerned, forms a chapter independent of the rest of Europe.

In considering the history of tobacco in England, we must distinguish between the introduction of the tobacco plant or plants and the custom of smoking tobacco, for it seems that tobacco was known or even planted in England a number of years before smoking was practised. The two earliest English botanists, John Gerard (1597) and John Parkinson (1640),

are familiar with the two principal species, *Nicotiana tabacum* (in two varieties) and *Nicotiana rustica*, so that at the outset we should be justified in assuming at least two introductions. Such indeed are upheld by tradition.

Edmund Howes, in his continuation of John Stow's "Annales or Generall Chronicle of England" (1631, p. 1038), states,—

"Tobacco was first brought and made known in England by Sir Iohn Hawkins, about the yeare 1565, but not used by Englishmen in many yeeres after, though at this day commonly used by most men, and many women."

Hawkins returned from his second voyage to the West Indies on the 20th of September, 1565, and had become familiar with tobacco and smoking in Florida. John Sparke the Younger, who wrote the account of this voyage (published by Hakluyt in 1589), writes that Hawkins, ranging along the coast of Florida for fresh water in July, 1565, came upon the French settlement there under Laudonnière, and continues thus: "The Floridians when they travell have a kind of herbe dryed, which with a cane, and an earthen cup in the end, with fire, and the dried herbs put together, do sucke thoro the cane the smoke thereof, which smoke satisfieth their hunger, and therewith they live foure or five days without meat or drinke, and this all the Frenchmen used for this purpose: yet do they holde opinion withall, that it causeth water and fleame to void from their stomacks." This is the earliest English notice of tobacco. It would be amazing if Hawkins and his companions should not have imitated this custom, and Hawkins may therefore have taken specimens of *Nicotiana rustica* and its seeds from Florida to England in 1565. It was from

Florida, as will be seen, that the plant was also introduced into Portugal and from Portugal into France.

It must be borne in mind, however, that Howes' statement is not coeval with the event to which he refers, but was drafted sixty-five years afterwards. In Stow's "Annales" it is entirely absent. It is therefore not consistent with the facts, as some authors have done, to attribute this and the data that follow below, contained in a book of 1631, to Stow, who died in 1606. Nor is Howes' assertion, as has been argued, corroborated by Taylor, the water-poet, who in a post-script to his versified *Life of Thomas Parr* says that tobacco was first brought into England in 1565 by Hawkins, adding, "It is a doubtful question whether the devil brought tobacco into England in a coach, for both appeared about the same time." Taylor's work was published in 1635, and his plea for Hawkins is simply copied from Howes. Nevertheless I am under the impression that Howes honestly reproduced a tradition which was current in the latter part of the sixteenth century and had come down to his own time. It is far less this tradition itself, however, than the total of the circumstantial evidence which compels us to pin our faith in Hawkins as the introducer of *Nicotiana rustica*; for this species was grown in England in the latter part of the sixteenth century, so that its presence in English soil must be accounted for in a reasonable manner. Dr. Brushfield, in 1898, formulated his opinion thus: "Tobacco was first imported into Europe about the year 1560, but not into England until a few years later. The first Englishman to notice it was Sir J. Hawkins in 1565; whether, however, he brought any to this country is unknown, most probably he did, the other alternative being its importation from Spain." In this view the botanical side of the question is disregarded, and Spain cannot be called to the witness-stand, as the Spaniards were

exclusive and never took the trouble of propagating tobacco or any other American plant to any country of Europe.

On the same page of the above work, Howes makes the further statement, "Apricocks, Mellycatons, Musk-Millions and Tobacco, came into England about the 20 yeare of Queene Elizabeth" [1577], and adds in the margin, "Sir Walter Raleigh was the first that brought Tobacco into use, when all men wondered what it meant." The two different dates are not so incompatible as it would seem at first sight: in that great age of unprecedented colonial expansion and seafaring enterprise tobacco must assuredly have arrested the attention of several navigators, and the fact that different species and varieties of *Nicotiana* were grown in England at least in the three last decades of the century proves that several introductions at different times and presumably from different parts of America must have been effected.

In February, 1593, William Harrison completed his great work of English Chronology two months before his death (April 24, 1593). The three large folios comprising volumes II-IV of his "Great Chronologie," which he says "he had gathered and compiled with most exquisit diligence," are preserved in manuscript in the Diocesan Library at Derry, Ireland. In the fourth volume the events from A.D. 1066 up to 1593 are chronicled year by year, and in it the data referring to his own time are of particular value. Extracts covering this period are given in Furnivall's edition of Harrison's Description of England (published for the New Shakspeare Society, 1876). Here we meet (p. LV) under the year 1573 the following fundamental document relating to tobacco and smoking, which has never been utilized or interpreted correctly and which is calculated to revise all former conceptions of the early history of tobacco in England.

"1573. In these daies the taking-in of the smoke of the Indian herbe called 'Tabaco,' by an instrument formed like a litle ladell, whereby it passeth from the mouth into the hed and stomach, is gretlie taken-up and used in England, against Rewmes and some other diseases ingendred in the longes and inward partes, and not without effect. This herbe as yet is not so comon, but that for want thereof divers do practize for the like purposes with the Nicetian, otherwise called in latine, 'Hyosciamus Luteus,' or the yellow henbane, albeit, not without gret error; for, althoughe that herbe be a soverene healer of old ulcers and sores reputed incurable outwardly, yet is not the smoke or vapour thereof so profitable to be receaued inwardly. The herbe [tobacco] is comonly of the height of a man, garnished with great long leaves like the paciens [Passions or Patience, *Rumex patientia* L.], bering seede, colloured, etc. of quantity like unto, or rather lesse then, the fine margeronie; the herbe it self yerely coming up also of the shaking of the seede. The colour of the floure is carnation, resembling that of the lemmon in forme: the roote yellow, with many filletes, and therto very small in comparison, if you respect the substauns of the herbe."

This is the memorable record of a contemporary eye-witness, who in his fascinating Description of England gives ample proof of his keen power of observation of customs and manners. His notice is based on direct and personal observation, it is not copied from hearsay or books. The botanical description is even unique, almost perfect, considering the fact that the writer was not a botanist, and represents the first English description of the species *Nicotiana tabacum*: for the herb is commonly of the height of a man, garnished with great long leaves and having flowers of carnation color—characteristics of *Nicotiana tabacum* only. The herb was then planted in England, but was

not yet common, and the henbane served smokers as a substitute; perhaps, however, Harrison's henbane, as suggested by the addition Nicetian (i.e. Nicotian), is *Nicotiana rustica*. Hyoscyamus, like Nicotiana, is a solanaceous plant of poisonous narcotic qualities. The first description of the tobacco plant in the botanical literature of Europe is that of the Italian botanist and physician Pierandrea Mattioli (1500-77) in his "Commentarii in Dioscoridem" (1565) under the name *Hyoscyamus niger*. The botanist Mathias de Lobel, as will be seen presently, affirms tobacco culture in England (prior to 1576) and describes pipe-smoking on the part of sailors who returned from America. Harrison therefore is in good company and upheld by the testimony of a contemporary. The tobacco plant was cultivated in England in 1573, a year before the discovery of Virginia, though not in sufficient quantity to satisfy general demand, and tobacco was smoked by Englishmen at that time from ladle-like instruments (perhaps similar to, or even identical with the subsequent pipes consisting of a half walnut, see below, p. 35). Harrison is the first English author who uses the word *tabaco*, the first who records the custom of smoking tobacco in England, and the first who describes its remedial properties and effects, and this independently of Monardes, whose work "Englished" by Frampton became known to the English public only in 1577.

Consequently the date 1577 given by Howes as that of the first introduction cannot be correct and must be discarded. The question arises, When and by whom was *Nicotiana tabacum*, ostensibly described by Harrison, introduced into England? At that time this species was widely disseminated from Mexico to the Antilles and South America; it could not have come to England from any point of North America, where *Nicotiana rustica* was the principal tobacco-furnishing

plant. *Nicotiana tabacum* was introduced into Virginia from Trinidad not earlier than about 1610 (W. Strachey, *Historie of Travaile into Virginia Britannia*, ed. of R. H. Major, p. 31). Now it happened that on the 9th of August, 1573, Francis Drake returned to Plymouth from his expedition to the West Indies. In the same year Harrison describes *Nicotiana tabacum* which is the typical *Nicotiana* species of the West Indies, and records the diffusion of tobacco-smoking in England. There is no accident in history, it is governed by the law of cause and effect. In my estimation, these two events cannot be a fortuitous coincidence, but are closely interrelated. In my opinion, therefore, it is reasonable to conclude, and there is no escape from the conclusion, that tobacco was brought to England again in 1573 by Sir Francis Drake (whether by himself personally or by a sailor or member of his expedition remains immaterial), and this was *Nicotiana tabacum*, known to Harrison and subsequently to John Gerard as "the greater sort of Tabaco brought into Europe out of the provinces of America, which we call the West Indies." There are, further, two weighty testimonies to the effect that tobacco was grown in England long before 1586, the date of the return of the Virginian colonists, which in most books is erroneously taken for the year of the first introduction of tobacco and smoking. There are the two botanists, Peter Pena and Mathias de Lobel (*Nova stirpium adversaria*, Antwerp, 1576, p. 251), who state positively that tobacco was then cultivated in Portugal, France, Belgium, and England; and this is good confirmation of Harrison's account. And there is Richard Hakluyt, who, in his instructions written for an English factor at Constantinople in 1582, states, "The seed of tabacco hath bene brought hither out of the West Indies, it groweth heere, and with the herbe many have bene eased of the reumes," etc. Again, in

this case, the West Indies hint at *Nicotiana tabacum* and at the exploits of Francis Drake. It may be noted also that H. Phillips (History of Cultivated Vegetables, 1822, Vol. II, p. 339) states that "tobacco was brought to England by Sir Francis Drake, in 1570, who that year made his first expedition against the Spaniards in South America."

On the 27th of July, 1586, the colonists settled in Virginia by Ralph Lane returned to England and disembarked at Plymouth. They offered their astounded countrymen the queer spectacle of smoking tobacco from pipes, which caused a general sensation. William Camden (1551-1623), the historiographer of Queen Elizabeth and a contemporary witness, reports this event as follows (*Annales rerum anglicarum*, 1615, p. 408; or *History of the Most Renowned and Victorious Princess Elizabeth*, 4th ed., 1688, p. 324):—

"And these men who were thus brought back were the first that I know of that brought into England that Indian plant which they call Tabacca and Nicotia, or Tobacco, which they used against crudities being taught it by the Indians. Certainly from that time forward it began to grow into great request, and to be sold at an high rate, whilst in a short time many men every-where, some for wantonness, some for health sake, with insatiable desire and greediness sucked in the stinking smoak thereof through an earthen pipe, which presently they blew out again at their nostrils: insomuch as tobacco-shops are now as ordinary in most towns as tap-houses and taverns. So that the Englishmens bodies, (as one said wittily,) which are so delighted with this plant, seem as it were to be degenerated into the nature of Barbarians, since they are delighted, and think they may be cured, with the same things which the Barbarians use."

From what has been said above it is clear that the band returning from Virginia was not instrumental in

introducing tobacco cultivation into England, for this was an established fact long before that time, neither were they the first smokers on British soil. It is solely popular imagination which has vividly retained this very event and which glorified Ralph Lane, Richard Grenville, or Walter Raleigh as the first smokers.

King James, in his "Counterblaste to Tobacco" (1604), alludes to the first introduction but vaguely, "Now to the corrupted basenesse of the first use of this Tobacco, doeth very well agree the foolish and groundlesse first entry thereof into this Kingdome. It is not so long since the first entry of this abuse amongst us here, as this present age cannot yet very well remember, both the first Author, and the forme of the first introduction of it amongst us. It was neither brought in by King, great Conquerour, nor learned Doctor of Phisicke. With the report of a great discovery for a Conquest, some two or three Savage men, were brought in, together with this Savage custome. But the pitie is, the poore wilde barbarous men died, but that vile barbarous custome is yet alive, yea in fresh vigor: so as it seemes a miracle to me, how a custome springing from so vile a ground, and brought in by a father so generally hated, should be welcomed upon so slender a warrant." This "father" no doubt is Sir Walter Raleigh, but it is not necessary to concur with Edward Arber, who justly denies that Raleigh had anything to do with the introduction of the weed itself or of the habit of smoking, in the conclusion that "the king wilfully or ignorantly falsified the history of the introduction of tobacco, concocting a degrading story for his purpose." The king's remark certainly savors of malice, but he may have honestly been persuaded that Raleigh was the first introducer.

Henry Buttes (Diets Dry Dinner, 1599) states, "Our English Ulisses, renomed Syr Walter Rawleigh, a man admirably excellent in Navigation, of Natures

privy counsell, and infinitely read in the wide booke of the worlde, hath both farre fetcht it, and deare bought it: the estimate of the treasure I leave to other." It may be perfectly true, of course, that Raleigh laid in a good supply of tobacco or secured it from Hariot, for his own consumption and the use of his friends. A letter of Sir John Stanhope to Sir G. Carew, dated January 26th, 1601, contains this paragraph: "I send you now no Tabacca, because Mr. Secretary, Sir Walter, and your other friends, as they say, have stored you of late; neither have I any proportion of it (that) is good, but only am rich in Aldermans Watses promises of plenty, wherewith you shall be acquainted, God willing." Raleigh may have been initiated into the art of smoking by Hariot, who had been sent out by him for the purpose of inquiring into the natural productions of Virginia. As indicated above (p. 2) after Hariot's own report, he smoked in Virginia and continued to smoke on his return to England.

E. Arber, in his valuable notes on the Introduction of Tobacco into England (1869), thinks that we have but little demonstrative proof of Raleigh's tobacco habit, but there is the testimony of John Parkinson (*Theatrum botanicum*, 1640, p. 711), who affirms that he knew Raleigh when he was prisoner in the Tower, and that Raleigh chose the "English Tabacco" (*Nicotiana rustica*) to make good tobacco of, "which he knew so rightly to cure that it was held almost as good as that which came from the Indies, and fully as good as any other made in England." This tobacco, however, was not thought to be so strong or sweet for the pipe, nor so efficient for diseases.

It is to Raleigh's merit that he made smoking fashionable and a gentlemanly art; his name became identified with the new national habit so thoroughly that later generations looked upon him as a kind of patron-saint of the smokers. Every one is familiar

with the anecdote that Raleigh, sitting one day in a deep meditation, with a pipe between his lips, bade his man to bring him a tankard of small ale. Believing that his master's head was set on fire, he threw the liquor in his face. In fact, however, this story appears for the first time in 1611 in the *Jests of Richard Tarleton*, and as has been shown by G. L. Apperson (*Social History of Smoking*, 1914), was fastened on Raleigh as late as 1708. The tradition that Raleigh smoked a pipe or two on the morning before his execution (October 29th, 1618) appears to be well founded. The Dean of Westminster, who attended him on this morning, testifies that "he eate his breakfast hertily and tooke tobacco." Aubrey thus defends his action: "He took a pipe of tobacco a little before he went to the scaffold, which some female (other reading: formal) persons were scandalized at; but I think 'twas well and properly donne to settle his spirits." No mention of tobacco has been discovered in any of Raleigh's printed works. His first testamentary note made shortly before his execution contains, as far as is yet known, his sole mention of tobacco and relates to that which remained on his ship after his ill-fated voyage: "Sir Lewis Stukeley sold all the tobacco at Plimouth of which, for the most part of it, I gave him a fift part of it, as also a role for my Lord Admirall and a role for himself. I desire that hee give his account for the tobacco."

Raleigh's tobacco-box was preserved at Leeds in Yorkshire, in the Museum of Ralph Thoresby, an antiquary, who died in 1725. Soon afterwards, William Oldys saw it there, and in his *life of Raleigh* prefixed to "The History of the World" (1736), describes it thus: "From the best of my memory, I can resemble its outward appearance to nothing more nearly than one of our modern Muff-cases; about the same height and width, cover'd with red leather, and open'd at top (but with a hinge, I think) like one of those. In the

inside, there was a cavity for a receiver of glass or metal, which might hold half a pound or a pound of tobacco; and from the edge of the receiver at top, to the edge of the box, a circular stay or collar, with holes in it, to plant the tobacco about, with six or eight pipes to smoke it in." R. Thoresby himself (*Ducatus Leodiensis*, 1715) gives the following, slightly different description: "Sir Walter Raleigh's tobacco-box, as it is called, but is rather the case for the glass wherein it was preserved, which was surrounded with small wax candles of various colours. This is of gilded leather, like a muff-case, about half a foot broad and thirteen inches high, and hath cases for sixteen pipes within it."

John Gerard (*The Herball of Generall Historie of Plantes*, 1597) writes that "there be two sorts or kindes of Tabaco, one greater, the other lesser; the greater was brought into Europe out of the provinces of America, which we call the West Indies: the other from Trinidad, an Ilande neere unto the continent of the same Indies. Some have added a third sort, and others making the yellow Henbane [*Nicotiana rustica*] for a kinde thereof. Being now planted in the gardens of Europe, it prospereth very well, and commeth from seede in one yeare to beare both floures and seede. The which I take to be better for the constitution of our bodies then that which is brought from India [America]; and that growing in the Indies better for the people of the same countrey: notwithstanding it is not so thought nor received of our Tabackians; for according to the English proverbe; Far fecht and deere bought is best for Ladies."

The tobacco of Trinidad is mentioned in 1595 by Robert Dudley (*Voyage to the West Indies*, p. 22): "The daie followinge, beinge Sondaie, in the morninge came the salvages with two canowes aborde us, as they had promised our men, bringinge such commodities

with them as their islande did afforde, saving they brought neither golde nor pearle, of the which theare are great store within the ilande, but tobacco, nutes and such kinde of fruites, the which they exchainged for knives, bugles, beades, fishing hookes and hatchetts."

Gerard, accordingly, was of opinion that the tobacco of English growth would best suit English constitutions, as that of America would agree with Americans; but this view was not seconded by the smokers of his day.

Francis Bacon entertained no illusion as to English-grown tobacco. In his "*Sylva Sylvarum: or a Natural History*" (IX, 855) he writes, "Tobacco is a thing of great price, if it be in request: for an acre of it will be worth (as is affirmed) two hundred pounds by the year towards charge. The charge of making the ground and otherwise is great, but nothing to the profit. But the English tobacco hath small credit, as being too dull and earthy; nay, the Virginian tobacco, though that be in a hotter climate, can get no credit for the same cause: so that a trial to make tobacco more aromatical, and better concocted, here in England, were a thing of great profit. Some have gone about to do it by drenching the English tobacco in a decoction or infusion of Indian tobacco; but those are but sophistications and toys; for nothing that is once perfect, and hath run his race, can receive much amendment. You must ever resort to the beginnings of things for melioration."

William Barclay (*Nepenthes, or the Vertues of Tabacco*, Edinburgh, 1614) recommends exclusively tobacco of American growth, "Albeit this herbe disdaines not to be nourished in many gardens in Spaine, in Italie, France, Flanders, Germanie and Brittain, yet neverthelesse only that which is fostered in India

[America] and brought home by Mariners and Traffiquers is to be used. But avarice and greedines of gaine have moved the Marchants to apparell some European plants with Indian coats, and to enstall them in shops as righteous and legittime Tabacco. . . So that the most fine, best and purest is that which is brought to Europe in leaves, and not rolled in puddings, as the English Navigators first brought home."

From the book "The Honestie of this Age, Proov-ing by good circumstance that the world was never honest till now, by Barnabee Rych Gentleman, Servant to the Kings most Excellent Maiestie" (1614) we receive a good idea of the increased consumption of tobacco and its sale. "There is not so base a groome, that commes into an Alehouse to call for his pot, but he must have his pipe of tobacco, for it is a commoditie that is nowe as vendible in every Taverne, Inne, and Ale house, as eyther Wine, Ale, or Beare, and for Apothicaries Shops, Grosers Shops, Chaundlers Shops, they are (almost) never without company, that from morning till night are still taking of Tobacco, what a number are there besides, that doe keepe houses, set open shoppes, that have no other trade to live by, but by the selling of Tobacco. I have heard it tolde that now very lately, there hath bin a Cathalogue taken of all those new erected houses that have set uppe that Trade of selling Tobacco, in London and neare about London: and if a man may beleeeve what is confidently reported, there are found to be upward of 7000 houses, that doth live by that trade. I cannot say whether they number Apothicaries shoppes, Grosers shops, and Chaundlers shops in this computation, but let it be that these were thrust in to make uppe the number: let us now looke a little into the *Vidimus* of the matter, and let us cast uppe but a sleight account, what the expence might be that is consumed in this smoakie vapoure.

"If it be true that there be 7000 shops, in and about London, that doth vent Tobacco, as it is credibly reported that there be over and above that number: it may well bee supposed, to be but an ill customed shoppe, that taketh not five shillings a day, one day with another, throughout the whole yeare, or if one doth take lesse, two other may take more: but let us make our account, but after 2 shillings sixe pence a day, for he that taketh lesse than that, would be ill able to pay his rent, or to keepe open his Shop Windowes, neither would Tobacco houses make such a muster as they doe, and that almost in every Lane, and in every by-corner round about London. Let us then reckon thus, 7000 halfe Crowns a day, amounteth just to 319,375 poundes a yeare. *Summa totalis*, All spent in *smoake*."

Tobacco then was an expensive pleasure. Aubrey informs us, "It was sold then for its wayte in silver, I have heard some of our old yeomen neighbours say, that when they went to Malmesbury or Chippenham Market, they culled out their biggest shillings to lay in the scales against the tobacco; now, the customes of it are the greatest his majestie hath." Compare the similar experience of the Koreans (Leaflet 18, p. 10).

C. T. published in 1615 "An Advice how to plant Tobacco in England: and how to bring it to colour and perfection, to whom it may be profitable, and to whom harmfull. The vertues of the Hearbe in generall, as well in the outward application as taken in Fume. With the danger of the Spanish Tobacco." The author's object is to instruct his countrymen in sowing, planting and perfecting this drug, as he viewed with alarm the vast sums annually spent on imported tobacco. He heard it reported by men of good judgment that there is paid out of England and Ireland near the value of 200,000 pounds every year for

tobacco, and that the greatest part thereof is bought for ready money. It was sold for ten times the value of pepper, and the best of it, weight for weight, for the finest silver; it was hard to find one pound weight in five hundred that was not sophisticated. We learn that tobacco was then imported into England from the coast of Guiana, from St. Vincents, St. Lucia, Dominica, and other places, where it was directly bought of the natives. All these sorts were clean, and so was that of St. Domingo, where the Spaniards had not yet learned the art of sophistication. There was also a sort of Caraccas tobacco, which the Indians made up and sold to the Spaniards, and which was wholesome enough, but little of it came to England. This tobacco is mentioned in 1595 by Robert Dudley (*Voyage to the West Indies*, p. 48), who speaks of "the coast of Cracos, called the high land of Paria, one of the fruitfulest places in the worlde for excellent good tobacco, which is called for his worthiness cane tobacco."

Under Queen Elizabeth there was an import duty of 2d. a pound on tobacco, raised by James in 1604 to 6s. 10d. (equal to 25s. present value), an advance of 4000 per cent. This heavy tax nearly ruined Virginia whose economic life was based on the cultivation of the plant. In 1611 the imports of tobacco from Virginia were reduced to 142,085 pounds, one-sixth of the quantity previously exported to England. Aside from Virginia, tobacco was supplied to England from the Bermudas, where it had first been planted in St. George's Island under the first governor, Moore (1612-15), but unsuccessfully (*Historye of the Bermudaes*, p. 29). Under the third governor, Tucker (1616-19), some thirty thousand weight of tobacco could be despatched into the mother-country; this "proveinge good, and comeinge to a luckye markett, gave great contentment and incouragement to the undertakers to proceede

lustely in their plantation." Fraudulent practices, however, were committed, and the Virginia Company of London complained bitterly to the governor, Nathaniel Butler (1619-22), anent its failure to sell a shipment of very vile conditioned tobacco, neither well cured, nor well made up. The governor, thereupon, appointed "triers of tobacco" under oath, whose duty it was to examine the crops, so that much false and bad ware was burned at the owners' doors. According to an order issued by Butler in 1621, better and poorer qualities had to be distinguished and packed separately, instead of being mixed with one another, as it had formerly been done.

In 1624 the importation of tobacco from Spain and Portugal was prohibited, and that from Virginia only allowed, so that the colony prospered again. James attempted to limit the supply at both ends by ordaining that no planter should export more than a hundred pounds a year and by creating a monopoly. Tobacco could be sold only by persons holding royal warrants of permission. These were granted for life on payment of fifteen pounds and an annual rent of the same amount.

The tobacco imported from Spanish America was called "Varinaes" up to 1639, and after that date "Spanish." It was obtained from Varina, near the foot of the range of mountains forming the west boundary of Venezuela, and watered by a branch of the Orinoco River. It was known in France as *Vérine* or *petum musqué*, and was introduced into Holland and Germany under the name *canaster* or *knaster* (from the Spanish *canastro*, "basket"), as it was rolled in cords and packed in baskets.

Coles wrote in 1657, "Tobacco prospers well about Winscomb, in Glocestershire, where I think the planting of it is now discontinued, because the store that came from thence was an hinderance to the publick

revenue coming in for the custome of that which is brought from beyond seas."

By various acts passed in the reign of Charles II (1660-85), the planting of tobacco was forbidden in England in favor of the colonies, on forfeiture of forty shillings for every rod of ground thus cultivated, excepting in physic gardens, where it was allowed in quantities not exceeding half a pole of ground. Justices of peace were empowered to issue warrants to constables to search after and destroy the plants. It appears that walnut-tree leaves were used as a substitute for tobacco; for the cutting of such leaves, or any other leaves (not being tobacco leaves) or coloring them so as to resemble tobacco or selling these mixed or unmixed for tobacco was forbidden under a penalty of forfeiting five shillings a pound.

J. W. Gent (*Systema Agriculturae; the Mystery of Husbandry Discovered*, 2d ed., 1675, p. 156) gives the following interesting information:—

"I thought to have omitted this plant, by reason the Statute-Laws are so severe against the planters of it, but that it is a plant so much improving land, and imploying so many hands, that in time it may gain footing in the good opinion of the landlord, as well as of the tenant, which may prove a means to obtain some liberty for its growth here, and not to be totally excluded out of the husbandmans farm. The great objection is the prejudice it would bring to navigation, the fewer ships being imployed; and the lessening his Majesties revenue. To which may be answered, that there are but few ships imployed to Virginia; and if many, yet there would be but few the less; for it's not to be imagined, that we should plant enough to furnish our whole nation, and maintain a trade abroad also: And in case it should lessen the number of ships for the present, they would soon encrease again, as the trade of Virginia would alter into other commodities,

as silk, wine and oyl, which would be a much better trade for them and us. And as to the lessening his Majesties revenue, the like imposition may be laid on the same commodity growing at home, as if imported from abroad, or some other of like value in lieu of it. Certain it is, that the planting of it would imploy abundance of people in tilling, planting, weeding, dressing and curing of it. And the improvement of land is very great, from ten shillings per acre, to thirty or forty pound per acre, all charges paid: before the last severe laws, many plantations were in Gloucestershire, Devonshire, Somersetshire, and Oxfordshire, to the quantity of many hundreds of acres.

“Some object, that our English-tobacco is not so good as the forreign; but if it be as well respected by the vulgar, let the more curious take the other that’s dearer. Although many are of opinion that it’s better than forreign, having a more *haut-gust*, which pleaseth some; if others like it not, they may in the curing of it make it milder, and by that means alter or change it as they please: It hath been often sold in London for Spanish tobacco. The best way and manner of planting and curing it, would be easily obtained by experience: many attempting it, some would be sure to discover the right way of ordering of it, and what ground or places it best affects. But that which hath been observed is, that it affects a rich, deep and warm soil well dressed in the spring before planting time: The young plants raised from seed in February or March, on a hot bed, and then planted abroad in your prepared ground, from whence you may expect a very good crop, and sometimes two crops in a year. The leaves, when gathered, are first laid together on heaps for some time, and then hang’d up (by threads run through them) in the shade, until they are through dry, and then put up and kept, the longer the better. In this, experience is the best master.”

THE GREAT TOBACCO CONTROVERSY IN ENGLAND

As no other nation, the English had to fight for their tobacco, no less than for their liberty, and they put up a gallant and heroic fight for it. The struggle opened soon after the introduction of the plant and, producing a considerable literature, persisted with varying fortunes throughout the seventeenth century.

The first detailed account of tobacco was given the English public in John Frampton's "Joyfull Newes oute of the Newe Founde Worlde" (London, 1577; other editions in 1580 and 1596), which is a translation from the Spanish of Nicolas Monardes' (1493-1588) *Three books on the drugs of America* (Sevilla, 1574). The whole catalogue of diseases and their treatment with various preparations of tobacco thus became accessible to English practitioners, and English literature on the subject is visibly imbued by this influence. Physicians were busily engaged in analyzing the properties of the herb and discovering its use in all diseases; it was recommended as an infallible cure for nearly every ill and as a preventive of many ailments. In all these discussions the work of the doctor of Sevilla remained the fundamental source. The reader of Frampton should bear in mind that the notice entitled "A further addition of the Hearbe called Tabaco" (fols. 42-45) is not translated from Monardes, but from the French work "La Maison rustique" of Liebault (see below, p. 50) in which an account of Nicot's introduction of tobacco into France is rendered. Dr. Brushfield errs in making Monardes acknowledge the assistance he received from Nicot; not a word is said about Nicot in the Spanish original of Monardes.

The curative virtues of the tobacco plant are noted by two poets. E. Spenser, in his *Fairy Queen* (1590),

makes Belpheobe include it with other medicinal herbs gathered to heal Timais (Book III, Canto VI, 32):—

Into the woods thenceforth in haste shee went,
To seeke for hearbes that mote him remedy;
For she of hearbes had great intendment,
Taught of the Nympe which from her infancy
Her nourced had in trew nobility:
There, whether yt divine Tobacco were,
Or Panachæa, or Polygony,
She fownd, and brought it to her patient deare,
Who al this while lay bleding out his hart-blood neare.

This is the earliest poetical allusion to tobacco in English literature. William Lilly, the Euphuist and court-poet to Queen Elizabeth, a great smoker himself, wrote a play *The Woman in the Moone* (1597), in which Pandora wounds a lover with a spear and sends her servant for herbs to cure him:—

Gather me balme and cooling violets,
And of our holy herb nicotian,
And bring withall pure honey from the hive,
To heale the wound of my unhappy hand.

Raphael Holinshed (*The First and Second Volumes of Chronicles*, now newlie augmented and continued to the yeare 1586 by Iohn Hooker alias Vowell and others, 1587, fol. 209) appears to have been without enthusiasm for the weed, for he writes, "How doe men extoll the use of Tabacco in my time, whereas in truth (whether the cause be in the repugnancie of our constitution unto the operation thereof, or that the ground doeth alter hir force, I cannot tell) it is not found of so great efficacie as they write."

The praise of the healing powers of tobacco was sung in an epigram by John Davies in 1598 (*Works of Marlowe*, ed. of F. Cunningham, p. 268). It begins thus:—

Homer of Moly, and Nepenthe sings,
Moly the gods' most sovereign herb divine;
Nepenthe, Helen's drink, most gladness brings,
Heart's grief expels, and doth the wits refine.
But this our age another world hath found,
From whence an herb of heavenly power is brought;
Moly is not so sovereign for a wound,

Nor hath Nepenthe so great wonders wrought.
 It is tobacco, whose sweet subtle fume,
 The hellish torment of the teeth doth ease,
 By drawing down, and drying up the rheum,
 The mother and the nurse of each disease.

Both sides of the controversy are skilfully represented in Ben Jonson's *Every Man in His Humor* (Act III, Scene 2), acted on the 25th of November, 1596, and printed in 1601. Bobadilla pleads thus in favor of the case: "Signior beleeve me, (upon my relation) for what I tel you, the world shall not improve. I have been in the Indies (where this herbe growes) where neither my selfe, nor a dozen Gentlemen more (of my knowledge) have received the taste of any other nutriment, in the world, for the space of one and twentie weekes, but Tabacco onely. Therefore it cannot be but 'tis most divine. Further, take it in the nature, in the true kinde so, it makes an Antidote, that (had you taken the most deadly poysonous simple in all Florence, it should expell it, and clarifie you with as much ease, as I speak. And for your greene wound, your *Balsamum*, and your—are all meere gulleries, and trash to it, especially your *Trinidado*: your *Newcotian* is good too: I could say that I know of the vertue of it, for the exposing of rewmes, raw humors, crudities, obstructions, with a thousand of this kind; but I professe my selfe no quack-salver: only thus much: by Hercules I doe holde it, and will affirme it (before any Prince in Europe) to be the most soveraigne, and pretious herbe that ever the earth tendred to the use of man." Then Cob represents the other side as follows: "By gods deynes: I marle what pleasure or felicitie they have in taking this roguish Tabacco; it's good for nothing but to choake a man, and fill him full of smoake and imbers: there were foure died out of one house last weeke with taking of it, and two more the bell went for yester-night, one of them (they say) will ne're scape it, he voyded a bushell of soote

yester-day, upward and downeward. By the stockes; and there were no wiser men then I, I'd have it present death, man or woman that should but deale with a Tabacco pipe; why, it will stifle them all in the 'nd as many as use it; it's little better than rats bane."

It is a matter of profound regret that Shakespeare has never alluded to tobacco and smoking.

In 1602 appeared a pamphlet entitled "Work for Chimny-sweepers: or a warning for Tabacconists. Describing the pernicious use of Tabacco, no lesse pleasant than profitable for all sorts to reade. Fumus patriae, Igne alieno Luculentior. As much as to say,

Better be chokt with English hemp,
then poisoned with Indian Tabacco.

Imprinted at London by T. Este, for Thomas Bushell, and are to be sould at the great North dore of Powles 1602." The anonymous author, who calls himself Philaretus, is said to have been ordered or compelled to write this invective, presumably by James I. He alleges eight reasons against tobacco, one of which is that the first author and finder hereof was the devil, and the first practisers were the devil's priests, and therefore not to be used of us Christians. The idea is not original, for it looms up in Monardes (in Frampton's translation, fol. 38): "And as the Devil is a deceaver, and hath the knowledge of the vertue of hearbes, so he did shew the vertue of this Hearb [to the Indians], that by the meanes thereof, they might see their imaginations, and visions, that he hath represented to them, and by that meanes deceive them." Ben Jonson also (*Gipsies Metamorphosis*) calls tobacco "the Devil's own weed," and according to Joshua Sylvester, "hell hath smoke impenitent tobaccanists to choake."

Dekker, in his *The Gull's Horn-Book* (1602), thus apostrophizes tobacco: "Make me thine adopted heir, that inheriting the virtues of thy whiffes, I may dis-

tribute them amongst all nations, and make the fantastic Englishman, above the rest, more cunning in the distinction of thy roll Trinidado, leaf, and pudding, than the whitest-toothed black-a-moor in all Asia."

In 1604 appeared King James' famed "A Counterblaste to Tobacco. Imprinted at London by R. B. Anno 1604." The king's name does not appear on the title-page, nor at the end of the preface To the Reader. He simply speaks of himself as the King. The royal pamphlet has met with almost universal condemnation, and W. Bragge (*Bibliotheca Nicotiana*, 1880) even says that "he most Quixotically broke his lance against one of the great appetites of man." To condemn is easier than to understand. In my opinion the Counterblaste is a remarkable document of considerable culture-historical interest, which must be understood and interpreted from the spirit of the time; and there is no doubt that James was actuated by good intentions and by a solicitous care for the welfare of his subjects, even though his blind hatred of tobacco carries him too far. He condemns its use primarily out of motives of racial and national pride: "And now good Countrey men let us (I pray you) consider, what honour or policie can move us to imitate the barbarous and beastly maners of the wild, godlesse, and slavish Indians, especially in so vile and stinking a custome? Shall wee that disdaine to imitate the maners of our neighbour France (having the stile of the first Christian Kingdom) and that cannot endure the spirit of the Spaniards (their King being now comparable in largenes of Dominions, to the great Emperor of Turkie) Shall wee, I say, that have bene so long civill and wealthy in Peace, famous and invincible in Warre, fortunate in both, we that have bene ever able to aide any of our neighbours (but never deafed any of their eares with any of our supplications for assistance) shall we, I say, without

blushing, abase our selves so farre, as to imitate these beastly Indians, slaves to the Spaniards, refuse to the world, and as yet aliens from the holy Covenant of God? Why doe we not as well imitate them in walking naked as they doe? in preferring glasses, feathers, and such toyes, to gold and precious stones, as they do? yea why do we not denie God and adore the Devill, as they doe?"

He goes on to refute, in the physiological terms of his time, the medicinal virtues of the drug, and after all the absurdities previously written in praise of its alleged healing powers, his arguments make rather refreshing reading. To the argument "that the whole people would not have taken so generall a good liking thereof, if they had not by experience found it verie soveraigne and good for them," he responds justly that this custom is merely based on imitation and fashion. "For such is the force of that naturall Selfe-love in every one of us, and such is the corruption of envie bred in the brest of every one, as we cannot be content unlesse we imitate every thing that our fellowes doe, and so proove our selves capable of every thing whereof they are capable, like Apes, counterfeiting the maners of others, to our owne destruction." The argument that people have been cured of diverse diseases by taking tobacco is fallacious and rests on a confusion of cause and effect; the disease takes its natural course and declines, but it is not tobacco that wrought this miracle. If a man smoke himself to death with it (and many have done), O then some other disease must beare the blame for that fault. He justly rejects the idea that tobacco could act as a panacea, a cure for all diseases in all persons and at all times. "O omnipotent power of Tobacco!" he exclaims, "And if it could by the smoke thereof chace out devils, as the smoke of Tobias fish did (which I am sure could smel no stronglier) it would serve for

a precious Relicke, but for the superstitious Priests, and the insolent Puritanes, to cast out devils withall."

As to the moral evaluation of smoking, the king holds that smokers are guilty of sinful and shameful lust, that its use or rather abuse is a branch of the sin of drunkenness, which is the root of all sins, and that it disables men for military service. "In the times of the many glorious and victorious battailes fought by this Nation, there was no word of Tobacco. But now if it were time of warres, and that you were to make some sudden Cavalcado upon your enemies, if any of you should seeke leisure to stay behinde his fellows for taking of Tobacco, for my part I should never bee sorie for any evill chance that might befall him. To take a custome in any thing that cannot bee left againe, is most harmefull to the people of any land." Finally, it is a waste of national wealth: "Now how you are by this custome disabled in your goods, let the Gentry of this land beare witnesse, some of them bestowing three, some foure hundred pounds a yeere upon this precious stinke, which I am sure might be bestowed upon many farre better uses."

He condemns the prevailing custom of smoking at the dinner-table when very often men that abhor it are present. Smoking in public had increased to such a degree that men sound in judgment were at last forced to take it also without desire, "partly because they were ashamed to seeme singular, and partly, to be as one that was content to eate Garlicke (which hee did not love) that he might not be troubled with the smell of it, in the breath of his fellowes." It was accordingly an act of self-defence. A man could not heartily welcome his friend now, but straight they must be in hand with tobacco. It was a point of good fellowship, and he who would refuse to take a pipe among his fellows was accounted peevish and no good company. "Yea the Mistresse cannot in a more

manerly kinde, entertaine her servant, then by giving him out of her faire hand a pipe of Tobacco." It is a great contempt of God's good gifts that the sweetness of man's breath, being a gift of God, should be willfully corrupted by this stinking smoke. "Moreover, which is a great iniquitie, and against all humanitie, the husband shall not bee ashamed, to reduce thereby his delicate, wholesome and cleane complexioned wife, to that extremitie, that either shee must also corrupt her sweete breath therewith, or else resolve to live in a perpetuall stinking torment."

He winds up his sermon as follows: "Have you not reason then to bee ashamed, and to forbear this filthie noveltie, so basely grounded, so foolishly received and so grossely mistaken in the right use thereof? In your abuse thereof sinning against God, harming your selves both in persons and goods, and raking also thereby the markes and notes of vanitie upon you: by the custome thereof making your selves to be wondered at by all forraine civil Nations, and by all strangers that come among you, to be scorned and contemned. A custome lothsome to the eye, hatefull to the Nose, harmefull to the braine, dangerous to the Lungs, and in the blacke stinking fume thereof, nearest resembling the horrible Stigian smoke of the pit that is bottomelesse."

In 1616 the Counterblaste was reprinted in Bishop Montagu's collected edition of James' "Workes," and in 1619 the Bishop published a Latin translation of the King's works in which the Counterblaste appears as "Misocapnus ['Smoke-hater'], sive de Abusu Tobacci Lusus Regius." While the royal diatribe is sizzling, of course, with misstatements, exaggerations, and outbursts of gloomy pessimism and unrestrained animosity, it was a natural reaction against the many exorbitant claims made by the

friends and defenders of the narcotic, and in his scathing denunciation of the tobacco excesses of his time the king was presumably nearly right. In our own days his phraseology has been echoed by Eliah the Prophet, and the Jameses we shall always have with us.

Nor did the king stop at purely platonic exhortations. Under the 17th day of October, 1604, he addressed at Westminster a *Commissio pro Tabacco* to the right Trustie and right Welbeloved Cousen and Counsellor, Thomas Earle of Dorset, high treasurer of England, who is commanded "to give order to all Customers, Comptrollers, Searchers, Surveyors, and all other Officers of our Portes, that they shall demaunde and take to our use of all Merchauntes, as well Englishe as Strangers, and of all others whoe shall bringe in anye Tabacco into this Realme, within any Porte Haven or Creek belonging to any theire severall Charges, the Somme of Six Shillinges and eighte Pence uppon everye Pound Waight thereof, over and above the Custome of Twoo Pence uppon the Pounce Waighte usuallie paide heretofore." Infractors were threatened with confiscation and blows. "If anye Merchaunte Englishe or Straunger, or other whatsoever, shall presume to bringe in anye of the saide Tabacco, before suche Payement and Satisfactione first made, That then he shall not onelie forfeite the saide Tabacco, but alsoe shall undergoe suche further Penalties and corporall Punishment as the Qualitie of suche soe highe a Contempte against our Royall and expresse Commaundement in this mannere published shall deserve."

As stated in the introductory paragraph of this order, the object of this measure was to restrain the heavy importations of tobacco, "whereby it is likelie that a lesse Quantitie of Tabacco will hereafter be broughte into this our Realm of England, Dominion

of Wales and Town of Barwick then in former tymes, and yet sufficient store to serve for their necessarie use who are of the better sort, and have and will use the same with Moderation to preserve their Healthe." The latter point is of great interest, for it does not crop up in the "Counterblaste." The king discriminates between a better and baser sort of people, and graciously concedes to the former a moderate use of the herb. By way of introduction he comments that tobacco was used and taken by the better sort both then and now only as physic to preserve health, "and is now at this Day, through evell Custome and the Toleration thereof, excessivelie taken by a number of ryotous and disordered Persons of meane and base Condition, whoe, contrarie to the use which Persons of good Callinge and Qualitye make thereof, doe spend most of there tyme in that idle Vanitie, to the evill example and corrupting of others, and also do consume that Wages whiche manye of them gett by their Labour, and wherewith there Families should be releived, not caring at what Price they buye that Drugge, but rather devisinge how to add to it other Mixture, thereby to make it the more delightfull to their Taste, though so much the more costly to there Purse; by which great and imoderate takinge of Tabacco the Health of a great number of our People is impayred, and their Bodies weakened and made unfit for Labor, the Estates of many mean Persons soe decayed and consumed as they are thereby dryven to unthrifitie Shifts onelie to maynteyne their gluttonous exercise thereof, besides that also a great part of the Treasure of our Lande is spent and exhausted by this onely Drugge so licentiously abused by the meaner sorte, all which enormous Inconveniencies ensuege there-uppon." The king's solicitude, accordingly, centered around the misera plebs, while the nobility is dismissed with a patronizing pat on the shoulders.

Edmund Gardiner, Gentleman and Practitioner in Physicke, wrote a medical defence in 1610 under the title, "The Triall of Tabacco. Wherein, his worth is most worthily expressed; as, in the name, nature, and qualitie of the sayd herb; his speciall use in all Physicke, with the true and right use of taking it, as well for the Seasons, and times, as also the Complexions, Dispositions, and Constitutions, of such Bodies, and Persons, as are fittest: and to whom it is most profitable to take it." A new edition appeared in 1650.

Joshua Sylvester published in 1614 in folio a poem under the title "Tabacco battered; and the Pipes shattered (About their Eeares that idly Idolize so base and barbarous a Weed; or at least-wise over-love so loathsome Vanitie): by a Volley of Holy Shot thundered from Mount Helicon. Du Bartas his Divine Weekes and Workes with a Compleate Collection of all the other most delight-full Workes Translated and written by yt famous Philomusus, Iosviah Sylvester gent: London, printed by Robert Young." The poem, like its title, is bombastic and dull: it threatens punishment with infernal rod in hell's dark furnace, with black fumes to choke, to those who on earth offended in smoke.

William Barclay's "Nepenthes, or the Vertues of Tabacco" (Edinburgh, 1614) is a vindication of tobacco, and is directed straight against the Counter-blaste. He recommends tobacco either green or dry for the cure of many maladies, either as a ball made from the fresh leaves big enough to fill the patient's mouth, or as a smoke on an empty stomach ("not as the English abusers do, which make a smoke-boxe of their skull"). In his dedication to the Bishop of Murray he calls on him to defend "this sacred herb."

A stranger plant, shipwrecked on our coast,
Is come to helpe this cold phlegmatic soyle.

He defends tobacco as having "much heavenlie vertue in store" and describes America as "the countrie which God hath honoured and blessed with this happie and holy herb."

John Deacon followed in the footsteps of James I and dedicated to him in 1616 "Tobacco tortured; or the filthie fume of Tobacco refined." This work is couched in the form of a dialogue between Capnistus and Hydrophorus. It is divided into two parts, (1) The Fume of Tobacco taken inward, is very pernicious unto the Body. (2) The Fume of Tobacco taken inward, is too too profluvius for many of our Tobacconists purses, and most pernicious to the publike State. One of the most curious attempts to prevent smoking in a family is contained in a will, dated October 20th, 1616, wherein P. Campbell leaves to his son all his household goods, "on this condition, that yf at any time hereafter, any of his brothers or sisters shall fynd him takeing of tobacco, that then he or she so fynding him, shall have the said goods."

Tobias Venner, Doctor of Physicke in Bath, published in 1621 "A Briefe and accurate treatise, concerning, The taking of the fume of Tobacco, which very many, in these dayes, doe too licentiously use. In which, the immoderate, irregular, and unseasonable use thereof is reprehended, and the true nature and best manner of using it, perspicuously demonstrated."

In this manner the struggle for or against the herb was continued, but ultimately ended in a complete triumph of tobacco, as an examination of the various manners in which it was consumed will show.

USE OF TOBACCO IN ENGLAND

It appears from Harrison's account (above, p. 7) that Englishmen took up tobacco-smoking from ladle-like pipes in 1573. From 1586 pipes were in full blast, and smoking during that early period was es-

entially fashionable. One of the characteristics of the gallant, the dandy of the time, was his devotion to tobacco. "To take tobacco with a grace" was one of a gentleman's accomplishments. Clusius, the botanist (*Exotica*, 1601, p. 310), speaks of the clay pipes made by the colonists in Virginia, and adds that from 1585 the use of tobacco increased throughout England to such a degree, particularly among the courtiers, that they had many similar tubes made after the model of those brought back from Virginia for tobacco-smoking.

John Gerard was familiar with the custom of smoking. "The drie leaves," he writes in his *Herball* (1597), "are used to be taken in a pipe set on fire and suckt into the stomacke, and thrust foorth again at the nostrils against the paines of the head, rheumes, aches in any part of the bodie, whereof soever the original doth proceed, whether from Fraunce, Italy, Spaine, Indies, or from our familiar and best knowne diseases."

All the early accounts agree in stating that the smoke was expelled through the nostrils,—an imitation of Indian custom. In a play by Field (1618), a foolish nobleman is asked by some boon companions in a tavern, "Will your lordship take any tobacco?" when another sneers, "'Sheart! he cannot put it through his nose!" There were professors of the art of smoking who taught pupils the "slights," as tricks with the pipe were called. These included exhaling the smoke in globes and rings. Ben Jonson describes one Sogliardo as "an essential clown, yet so enamored of the name of a gentleman that he will have it though he buys it; he comes up every term to learn to take tobacco and see new motions." Hence Marston could make the joke, "Her love is just like a whiffe of Tobacco, no sooner in at the mouth, but out at the nose." This practice, it is said, died out after the death of

James I (1625), and from that time onward the fumes were plainly discharged from the mouth. Smoking then lost its medical aspect and developed into an honest, every-day pastime and pleasure.

In 1660 Winstanley declared, "Tobacco it self is by few taken now as medicinal, it is grown a good-fellow, and fallen from a Physician to a Complement. He's no good-fellow that's without burnt Pipes, Tobacco, and His Tinder Box."

Silver pipes are mentioned by Sir William Vaughan (*Naturall and Artificiall Directions for Health*, 1602, p. 22): "Cane Tabacco well dryed, and taken in a silver pipe fasting in the morning, cureth the megrim, the tooth ache, obstructions proceeding of cold, and helpeth the fits of the mother. After meales it doth much hurt, for it infecteth the braine and the liver."

In John Aubrey's *Letters* written by Eminent Persons we read, "They had first silver pipes. The ordinary sort made use of a walnut shell and a strawe. I have heard my grandfather Lyte say, that one pipe was handed from man to man round the table." This was done because the cost of a pipe was considerable.

Paul Hentzner (*Itinerarium*), a German lawyer, who visited England in 1598, has recorded the following observation: "At these spectacles [in the London theatres] and everywhere else, the English are constantly smoking Tobacco, and in this manner: they have pipes on purpose made of clay, into the farther end of which they put the herb, so dry that it may be rubbed into powder, and lighting it, they draw the smoake into their mouths, which they puff out again through their nostrils like funnels, along with it plenty of phlegm and defluxion from the head."

The clay pipe first made about 1590 soon became fashionable and the typical English pipe. It achieved fame all over Europe and was imitated in Holland and

Germany. The English became the adepts of the pipe-cult and the initiators and propagators of pipe-smoking in Europe. The first pipes had small, pear-shaped bowls and short stems, from three to six inches in length. Under the bowl was a flat heel, enabling the pipe to stand upright on a table. In 1619 the pipe-makers received their charter of incorporation from James I. The Company of Pipe-makers consisted of a master, four wardens, and twenty-four assistants. Their escutcheon bore a tobacco plant in full blossom, and their motto was "Let brotherly love continue." All pipes then were made of clay, though occasionally some were made of iron or brass. Under the reign of William III (1689-1702) the Dutch style with larger bowls and long, straight stems was adopted. Wooden pipes and briars appeared only from the latter half of the nineteenth century; briar (from the French *bruyère*, "heath") is the root of the tree heath (*Erica arborea*), a native of southern France. The English are still masters of the pipe, turning out the best pipes and the best smoking mixtures; a good English pipe makes a man feel that life is still worth living. The pipe is the emblem of strength and manliness, of peace and brotherhood, of liberty and democratic government. "The pipe," says Thackeray, "draws wisdom from the lips of the philosopher, and shuts up the mouth of the foolish; it generates a style of conversation, contemplative, thoughtful, benevolent and unaffected. May I die if I abuse that kindly weed which has given me so much pleasure." As the English had preceded all other European nations in the struggle for liberty and human rights and had set the model for constitutional and parliamentary government, history justly assigned to them the distinction of carrying this emblem all over the world.

Maple blocks were used in the old days for cutting or shredding the tobacco upon. The pipes were

formerly lighted by means of live charcoal from juniper wood. King James says in his *Counterblaste* (1604), "In your persons having by this continuall vile custome brought your selves to this shameful imbecilitie, that you are not able to ride or walke the iourney of a Jewes Sabbath, but you must have a reekie cole brought you from the next poore house to kindle your Tobacco with?" William Barclay (*Nepenthes*, or the *Vertues of Tabacco*, Edinburgh, 1614) tells this story: "I chanced in company on a tyme with an English merchant in Normandie betweene Rowen and New-haven. This fellow was a merrie man, but at every house he must have a Cole to kindle his Tabacco: the Frenchman wondered, and I laughed at his intemperancie." Silver tongs, called ember-tongs or brand-tongs, were used in lifting the hot charcoal to light the pipe.

Many old English "clays" are provided with the maker's initials. Monograms and designs were stamped or moulded upon the bowls and stems, but more generally upon the spur or flat heel of the pipe. During the latter half of the seventeenth century English pipes were presented by colonists in America to the Indians. They subsequently became valuable as objects of barter or part purchase price in exchange for land. In 1677, one hundred and twenty pipes and one hundred Jew's harps were given for a strip of land near Timber Creek in New Jersey. When William Penn, the founder of Pennsylvania, purchased a tract of land, three hundred pipes were included in the articles given in the exchange.

It was customary for a man to carry a case of pipes about with him. In *Everie Woman in Her Humour*, a play written in 1609, there is an inventory of the contents of a gentleman's pocket, with a value given for each item. A case of tobacco-pipes is appraised at fourpence; half an ounce of tobacco, at

sixpence, and three pence in coin, or, as it is quaintly worded, "in money and golde." Satirists poked fun at the smoker's pocketful of apparatus. A pamphleteer of 1609 says, "I behelde pipes in his pocket; now he draweth forth his tinder-box and his touchwood, and falleth to his tacklings; sure his throat is on fire, the smoke flyeth so fast from his mouth." In his "*Epigrammata religiosa, officiosa, iocosa*" (privately printed, London, 1627), John Pyne of Bearferres, of whose life no details are known, has left the following Epitaph of a certaine Tobacchonist:—

Loe heere I lye roll'd up like th' Indian Weed,
My Pipes I have pack'd up, for Breath I need.
Mans Breath's a vapour, Hee himselfe is Grasse;
My Breath but of a Weed the vapour was.
When I shall turne to Earth, Good Friends beware,
Lest it evaporate and infect the Aire.

Besides the instruments mentioned, a tobacco-box (pouches were then unknown) was indispensable to the rich young gallant. The boxes were made of silver, iron, copper, brass, ivory, mother-of-pearl, tortoise-shell, bone, or wood, curiously and artistically carved. They were usually small enough to be carried in the pocket, and contained, in addition to the weed, a pipe, the ember-tongs, flint and steel, and a priming-iron. Occasionally a looking-glass was set in the box. Tobacco-boxes were given and exchanged as tokens of friendship. In those days, when tobacco was eight or ten shillings a pound, smokers were economic and burned their tobacco to the very bottom of the bowl, pressing the ashes down by means of a stopper. The stoppers were made of wood, bone, ivory, mother-of-pearl, brass, silver, or gold, of various shapes, and adorned with figures of national heroes or heads of animals. Some smokers wore rings provided with a stud for ramming down the contents of the pipe.

During the Elizabethan period and after women smoked as well as men (cf. Howes, above, p. 4). In

Dekker's *Satiromastix* (1602) Asinius Babo, offering his pipe, observes, "'Tis at your service, gallants, and the tobacco too: 'tis right pudding, I can tell you; a lady or two took a pipe full or two at my hands, and praised it, fore the heavens." In Heywood's *Fair Maid of the Exchange* (1607), one of the characters is advised to court a girl by "asking her if she'll take a pipe of tobacco." William Prynne, the famous Puritanic inveigher against stage-plays, informs us that in his time ladies at the theatre were sometimes offered the tobacco-pipe as a refreshment instead of apples. On the title-page of Middleton's comedy, *The Roaring Girle* (1611), is a picture of the heroine in man's apparel, smoking a pipe from which a cloud of smoke is issuing. The portrait of a woman, painted about 1651, holding in her right hand a tobacco-box and gracefully wielding in her left a pipe, is reproduced in Fairholt's book "Tobacco" (p. 69).

In the *British Apollo* (Vol. I, 1708) it is stated, "Snuff, tho' the use of it has been long known to such, as were by merchandizing or other means, familiar with the Spanish customes, has been till lately, a perfect stranger to the practice of the British nation, and like our other fashions came to us from France." In the Oxford English Dictionary we are informed, "The practice of taking snuff appears to have become fashionable about 1680, but prevailed earlier in Ireland and Scotland." In general this certainly is correct, but snuff was not entirely foreign to the Elizabethan age. The following two references may serve as evidence.

Henry Buttes (*Diets Dry Dinner*, 1599), in his discourse of tobacco, writes, "Translated out of India in the seed or roote; Native or sative in our own fruit-fullest soiles: Dried in the shade, and compiled very close: of a tawny colour, somewhat inclining to red: most perspicuous and cleare: which the Nose soonest taketh in snuffe."

Dekker, in his "The Gull's Horn-book" (1602), thus describes the approved fashion in his day: "Before the meat come smoking to the board, our gallant must draw out his tobacco-box, the ladle for the cold snuff into the nostril, the tongs, and priming-iron; all which artillery may be of gold or silver, if he can reach the price of it; it will be a reasonable useful pawn at all times, when the amount of his money falls out to run low. And here you must observe to know in what tobacco is in town, better than the merchants, and to discourse of the apothecaries where it is to be sold; then let him show his several tricks in taking it, as the whiff, the ring, etc., for these are compliments that gain gentlemen no mean respect." As Englishmen always preferred the pipe, we hear little of snuff in the first part of the sixteenth century. Irish and Scotch preferred snuff, formerly also called sneeshing, sneezing, and smutchin (from Irish *smuitedán*, "powder"; Scotch and Gaelic *smuidean*, "a mote, a particle of dust"). Howell (1650) writes in his Letters, "The Spaniards and Irish take tobacco in powder or smutchin, and it mightily refreshes the brain. I believe there is as much taken this way in Ireland as there is in pipes in England. One shall see the serving-maid upon the washing-block and the swain upon the plough-share, when they are tired with their labour, take out their boxes of smutchin and draw into their nostrils with a quill; and it will beget new spirits in them and fresh vigour to fall to their work again."

The plague of 1665 first brought snuff into prominence in England on account of its disinfectant properties. It developed into a fashion under the reign of Queen Anne (1702-14), when French ideas and manners conquered English society and inaugurated a veritable age of snuff, which completely displaced smoking in society. To take snuff was then as essential a part of gallantry as to drink tobacco had been a century before.

A gentleman was then known by his snuff and snuff-box, and snuff-taking was universal in the fashionable world among both men and women. Alexander Pope (1688-1744), in *The Rape of the Lock*, wrote:—

Sir Plume, of amber snuff-box justly vain,
And the nice conduct of a clouded cane,
With earnest eyes and round, unthinking face
He first the snuff-box opened, then the case.

And Oliver Goldsmith (1728-74), in *Retaliation*:—

When they talk'd of their Raphaels, Correggios, and stuff,
He shifted his trumpet and only took snuff.

The snuff-box was the fetish of the eighteenth century, an object of luxury, a tribute of friendship and admiration, a gift to kings and ambassadors. There was an infinite number of snuffs, and there were morning, afternoon, and evening snuffs.

At first, snuff was not sold ready-made, but every one prepared it himself. It was scraped with a rasp made from the dry root of the tobacco plant; the powder was then placed on the back of the hand and thus snuffed up. Hence the name *râpé* ("rasped, grated") for a coarse kind of snuff made from the darker and ranker tobacco leaves. The rasps were carried in the waistcoat pocket, and became articles of luxury, being carved in ivory and variously enriched. The tobacconist's shop-sign, in the early days, was the figure of a Virginian or Negro or a combination of both; in the eighteenth century and until a few years ago it was replaced with the figure of a Highlander, usually with a snuff mull in his hand, credited as he was with a great fondness and capacity for snuff-taking. Walter Scott said that a Scotchman in London would walk half a mile farther to purchase his ounce of snuff where the sign of the Highlander announced a North Briton. After the suppression of the Jacobite uprising of 1745, when the wearing of the highland costume was forbidden by Parliament, the following paragraph appeared in the newspapers of the time: "We hear

that the dapper wooden Highlanders, who guard so heroically the doors of snuff-shops, intend to petition the Legislature, in order that they may be excused from complying with the Act of Parliament with regard to their change of dress: alledging that they have ever been faithful subjects to his Majesty, having constantly supplied his Guards with a pinch out of their Mulls when they marched by them, and so far from engaging in any Rebellion, that they have never entertained a rebellious thought; whence they humbly hope that they shall not be put to the expense of buying new cloaths."

It has often been stated that snuff-taking is practically extinct. The latest news from London (June 12th, 1924) indicates that there is a definite increase in the consumption of snuff among women and that jewellers find a ready sale for daintily jewelled snuff-boxes.

Of the manifold forms in which tobacco is consumed the custom of chewing it is the most striking and perhaps even the most primitive. The aborigines of Australia, we now know for certain, were in the habit of chewing the leaves of *Nicotiana suaveolens*, a species native to Australia, in times prior to their contact with the whites, but they were totally ignorant of smoking the leaves. This example demonstrates well that primitive man, in testing the properties of a vegetable product, will first exercise his senses of touch, smell, and taste. The Spanish conquerors came into contact with the habit of chewing tobacco in the West Indies (account of Amerigo Vespucci) and Mexico (early accounts of B. de Sahagun and F. Hernandez). Monardes (1571) describes it as follows: "The Indians use tobacco to remove thirst which in this case they will not suffer, and likewise to stand hunger and to be able to pass days without being compelled to eat or drink. When they have to travel

across a desert or unpopulous region, where neither water nor food is to be found, they avail themselves of some pills made of tobacco in this manner: they take the leaves of the plant and chew them, and while chewing, they mix them with a powder prepared from burnt river-mussels; this they mix in their mouth together till it forms a mass which they shape into pills a bit larger than peas; these are placed in the shadow to dry, are then preserved, and used in this form. Whenever they travel through territories where they believe not to find water or victuals, they take one of these pills, placing it between their under lips and teeth, and keep on chewing it continually during their journey, and thus they go along for three or four days without having to eat or drink or feeling the pinch of hunger or thirst or fatigue."

As Monardes was translated into Latin, French, Italian, and English, Europeans might easily have copied his prescription, but the fact remains that they did not. Leaves may occasionally have been chewed for medicinal purposes, but no habit of chewing for pastime or pleasure was developed. Gerard (*The Herball*, 1597, p. 286) observes, "The leaves likewise being chewed draw forth flegme and water" . . . Edmund Gardiner, in his "*Triall of Tobacco*" (first published in 1610, new ed. 1650), says that "a sirup made of the decoction of this herbe, with sufficient sugar, and so taken in a very small quantitie, dischargeth the breast from phlegmatic matter." John Parkinson (*Theatrum botanicum*, 1640, p. 712) writes also that in his time the juice from the leaves of *Nicotiana rustica* was made into a syrup, or that the distilled water of the herb was taken with or without sugar, or the smoke was inhaled from a pipe, as usual. Obviously Parkinson here opposes to the common habit of pipe-smoking another less usual practice, that of taking a syrupy substance extracted from the leaf. At

best, however, we are here confronted with a distant forerunner of chewing, not with chewing properly.

As far as I am able to make out, it seems that tobacco-chewing was taken up as a prophylactic against the plague which was epidemic in 1665. Samuel Pepys writes in his Diary under 7th June, 1665, "This day, much against my will, I did in Drury Lane see two or three houses marked with a red cross upon the doors, and 'Lord have mercy upon us' writ there; which was a sad sight to me, being the first of the kind that, to my remembrance, I ever saw. It put me into an ill conception of myself and my smell, so that I was forced to buy some roll-tobacco to smell to and chaw, which took away the apprehension." In the year of the plague appeared a quarto tract, entitled "A Brief Treatise of the Nature, Causes, Signs, Preservation from and Cure of the Pestilence," by W. Kemp, "Mr. of Arts," who says in regard to tobacco, "It corrects the air by Fumigation, and it avoids corrupt humours by Salivation; for when one takes it either by Chewing it in the leaf, or Smoaking it in the pipe, the humours are drawn and brought from all parts of the body, to the stomach, and from thence rising up to the mouth of the Tobacconist, as to the helme of a Sublimatory, are voided and spitten out." Derby was visited by the plague in the same year, and at the "Headless-cross the market-people, having their mouths primed with tobacco as a preservative, brought their provisions. It was observed that this cruel affliction never attempted the premises of a tobacconist, a tanner, or a shoemaker" (W. Hutton, History of Derby, 1817, p. 194).

The belief in the efficacy of tobacco as warding off the plague acted also as a new incentive to the increase of smoking. Thomas Hearne (1721), the antiquary, gives the following curious information: "I have been told that in the last great plague at London none that

kept tobaconist's shops had the plague. It is certain, that smoaking it was looked upon as a most excellent preservative, in so much, that even children were obliged to smoak. And I remember, that I heard formerly Tom Rogers, who was yeoman beadle, say, that when he was that year, when the plague raged, a schoolboy at Eaton, all the boys at that school were obliged to smoak in the school every morning, and that he was never whipped so much in his life as he was one morning for not smoaking." Thomas Pope Blount (*A Natural History*; containing many not common observations, 1693, p. 127) writes, "Diemerbrockins, in his book *De Peste*, very much commends the use of tobacco in the time of plague; he says, it absolutely cured him when he had it; he also observes, that almost all those houses, where tobacco was sold, both in Spires (a city in the Palatinate) and likewise in London, were never infected, whereas the houses round about them were."

According to Penn, the chewing of tobacco was common in the reign of James, when gentlemen carried about with them small silver basins as spittoons, and Monk, the principal factor in the restoration of the monarchy, brought it into fashion; but no documentary evidence is produced by him. Apperson comments, "General Monk, to whom Charles II owed so much, is said to have indulged in the unpleasant habit of chewing tobacco, and to have been imitated by others; but the practice can never have been common."

In 1689, W. Bullock speaks of "two rowles of chawing tobacco." The *London Gazette* of 1725 mentions a fellow who "commonly has a chew of tobacco in his under lip"; and Smollett, in *Roderick Random* (1748), has a sailor putting a large chew of tobacco in his mouth. The *World* of 1754 pokes fun at the "pretty" young men who "take pains to appear manly; their chewing not only offends, but makes us appre-

hensive at the same time that the poor things will be sick." E. Baillard (*Discours du tabac*, 1693, p. 92) refers to chewing tobacco (*tabac machicatoire*) as relieving hunger and thirst, but does not say that it was actually used in France. In the eighteenth century a common device of tobacconists was three figures representing a Dutchman, a Scotchman, and a sailor, explained by the accompanying rhyme:

We three are engaged in one cause,
I snuffs, I smokes, and I chaws!

Another tobacconist had the three men on his sign, but with a different legend:

This Indian weed is good indeed,
Puff on, keep up the joke.
'Tis the best, 'twill stand the test,
Either to chew or smoke.

The promoters of the cigar in Europe were the Spaniards, but they were exceedingly slow in making their product known to the other nations of Europe. The cigar spread in Europe only in the first part of last century. English authors of the eighteenth century, when using the word, feel obliged to explain to their readers what it means. Thus J. Cockburn, speaking in 1735 of three friars at Nicaragua, says, "These gentlemen gave us some Seegars to smoke. These are leaves of tobacco rolled up in such manner that they serve both for a pipe and tobacco itself; they know no other way here, for there is no such thing as a tobacco-pipe throughout New Spain." Victor Hugo (*Les Misérables*) describes a fellow "carrying in his hand a powerful cane worth two hundred francs, and as he could afford everything, carrying in his mouth a strange thing, called cigar." The first cigar-factory after Spanish model was established at Hamburg in 1788 by H. H. Schlottmann, and the cigar came into general use in Germany about 1793. Kant (*Anthropologie*, 1798) still uses the Spanish form *zigarro*. The Peninsular War was the occasion for both French and

English adopting the cigar from the Spaniards. The importation of cigars into England was at first prohibited; after the peace of 1815, they were admitted at the duty of 18 shillings a pound. When the duty was reduced to 9 shillings, the import reached the figure of 253,882 pounds in 1830. Cigars then were strictly an aristocratic luxury. Lord Byron (*The Island*, 1823, Canto II, 19) has sung the praise of the cigar, and has simultaneously furnished the only eulogy of tobacco that can lay claim to real poetry.

Sublime tobacco! which from east to west
 Cheers the tar's labour or the Turkman's rest;
 Which on the Moslem's ottoman divides
 His hours, and rivals opium and his brides;
 Magnificent in Stamboul, but less grand,
 Though not less loved, in Wapping or the Strand;
 Divine in hookas, glorious in a pipe,
 When tipp'd with amber, mellow, rich, and ripe;
 Like other charmers, wooing the caress,
 More dazingly when daring in full dress;
 Yet thy true lovers more admire by far
 Thy naked beauties—Give me a cigar!

J. W. Croker, in 1831, observed, "The taste for smoking has revived, probably from the military habits of Europe during the French wars; but instead of the sober sedentary pipe, the ambulatory cigar is chiefly used."

The cigarette was introduced into England by British officers who had served in the Crimean Campaign of 1854-56 and had taken to the cigarette smoked by their French and Turkish allies. It first became fashionable among club-men and in high social circles. Laurence Oliphant, both a man of letters and a man of fashion, is generally credited with the introduction into English society of the cigarette. At that time smokers made their own cigarettes as they needed them. About 1865 or 1866 their use had so spread that manufacturers began to cater for cigarette smokers. Even then they employed only a single man, usually a Pole or Russian, to make up cigarettes

occasionally. They were perhaps in fashion by 1870, and the social history of smoking in later Victorian days is marked by the triumph of the cigarette.

TOBACCO IN FRANCE, PORTUGAL, SPAIN, AND ITALY

There were two introductions of the tobacco plant into France during the sixteenth century, due to André Thevet and Jean Nicot, respectively. Thevet was born at Angoulême in 1502, joined the Franciscan order, and studied theology without acquiring a taste for scholasticism. Though not equipped with a critical spirit and lacking solid knowledge, he was fond of travel, being stimulated by a passion for inquiring into curiosities, extraordinary or little known objects. In 1555 he accompanied N. Duardo Villegaignon as chaplain on an expedition to Brazil, which had as its object to found a French settlement on the river Ganabra or Santo Januario (the present Rio de Janeiro). He spent three months in Brazil from November 1555 to January 1556, taking part in an expedition to La Plata, where he had a narrow escape from hostile Patagonians; a Scotchman saved his life. On his return to France he published in 1557 a book on his experiences under the title "*Les Singularitez de la France antarctique, autrement nommée Amerique: et de plusieurs terres et isles decouvertes de nostre temps.*" An English translation was printed in London, 1568, under the title "*The New Found Worlde, or Ant-arctike, wherin is contained wonderful and strange things.*" This book, somewhat bizarre and poorly organized, contains a number of interesting observations concerning the country and the life of the natives of Brazil, but two thirds of the volume deal with Africa, Peru, the Antilles, Florida, and Canada, and are compiled from oral reports or printed accounts. In this work (fol. 60) Thevet describes the use of tobacco

under the name *petun* (the Tupi-Guarani word *pituma* or *pitima*) on the part of the aborigines, who rolled the leaf and wrapped it in a large palm-leaf to the length of a candle. As is well known, the natives of Brazil never availed themselves of the pipe, but only used tobacco in the form of the cigar. Thevet's description is perfectly correct; he says also that he himself tried the novel herb with some bad effects. In another passage of his work (fol. 153) he records the habit of pipe-smoking in Canada, but he does not mention that he took the plant or its seeds along to France. As late as 1575, in his "Cosmographie universelle," he advanced the claim, "I can boast of having been the first in France who brought the seed of this plant, who sowed it and named the plant in question *herbe Angoulmoisine* [after the place of his birth]. Since then, a certain individual (*un quidam*) who never made any voyage has given it his name, some ten years after my return."

This *quidam* was Jean Nicot, born at Nîmes in 1530 as the son of a notary public and educated in Paris. He was French ambassador to Portugal from 1559 to 1561. One day he went to see the prisons of the king of Portugal, and the keeper of the prisons presented him with an herb as a strange plant brought from Florida. According to another version, it was a Flemish gentleman, Damian de Goes, who in 1558 had first cultivated tobacco in the royal garden of Lisbon, the seeds having been imported from Florida. Nicot cultivated the herb in his garden in 1559, being primarily interested in its medicinal properties, and accomplished several marvelous cures. When the success of his experiments was assured, he forwarded specimens, seeds and leaves, to King François II and Catherine de Medici, the queen-mother, with proper directions as to how to apply the drug. From 1560 tobacco cultivation began to spread in France. On

his return to France in 1561 Nicot offered the queen a box of powdered tobacco which she employed as a remedy for headaches.

In 1573 Nicot published in collaboration with several scholars a French-Latin Dictionary a copy of which may be seen in the Newberry Library, Chicago. Here we meet (p. 478) the word *Nicotiane* with the following definition: "This is an herb of marvelous virtue against all wounds, ulcers, Noli me tangere [lupus or other eroding ulcer of the face], herpes, and other such like things, which Master Jehan Nicot, being ambassador to the king of Portugal, sent to France, and from whom it has derived its name. See La Maison rustique, book chap. " The blank spaces after "book" and "chap." are not filled out. The book in question is a work on agriculture published in Paris, 1570, by Charles Estienne and Jean Liebault or Liebaut, who gave the first directions for the cultivation of tobacco; they also point out its medicinal virtues and refer to the Indians of Florida as smoking the leaf from tubes (*cornets*). Their information, accordingly, is based on Nicot, not on Thevet. Indeed Liebaut admits that he received oral and written accounts directly from Nicot, which are embodied in his work, and which were introduced to the English public in John Frampton's "Joyfull Newes out of the Newe Founde Worlde" (1577). He consecrates the name *nicotiane* in preference to *petum*, in order to honor him who first sent the herb to France.

Olivier de Serres, whose "Theatre d'agriculture" was first published in 1600, gives credit solely to Nicot, although, as will be shown below, he must have been acquainted with Thevet's work. Official France has always been prejudiced against the latter, and has heralded Nicot as the only genuine introducer of the plant. In the "Biographie universelle" it is stated under Nicot, "The Franciscan Thevet has contested

to Nicot the glory of having enriched France with tobacco; but his pretention has not been favorably received, and the name *Nicotiane* first conferred upon tobacco has persisted, at least in scientific speech. It is not probable, however, that Nicot was conscious of the importance of the gift which he offered to the queen-mother, and that he foresaw that this gift would some day be thirty millions of revenue worth to the state." In Thevet's biography in the same collection, his claim is not even mentioned, while a latent animus crops up here and there: he is characterized as "known for his credulity," yet he is acquitted of ignorance and lying, and is credited at least with knowledge of languages and geography.

On the other hand, Paul Gaffarel, in his introduction to a re-edition of Thevet's "Singularitez" (1878), makes this strong plea on behalf of his hero, "The legitimate vindication of Thevet has never found a hearing. The designation *herbe angoulmoisine* which he had the right to impose on tobacco was denied acceptance, and oblivious posterity continued and continues to thank Nicot for a benefit for which it is not indebted to him. We may be permitted at least to brand this iniquitous judgment as false and to proclaim loudly that to Thevet and solely to Thevet the public treasury owes its most magnificent revenue and the majority of our readers a daily enjoyment." This panegyric is biased and overshoots the mark, for Nicot cannot be ruled out of court completely. The plain truth in the matter is that France owes her tobacco to Thevet and Nicot equally; but the division into the two camps of the Nicotophiles and Thevetophiles demonstrates sufficiently that the subject is not correctly understood.

It is perfectly clear that Thevet and Nicot introduced different plants: the species introduced by Thevet from Brazil can but have been *Nicotiana tabacum* (of

some Brazilian variety), and what Nicot introduced must have been *N. rustica*, which flourished in Florida, where *N. tabacum* was at that time unknown. This condition of affairs is plainly reflected by the work of Olivier de Serres referred to above, who distinguishes two species (wrongly taken by him as the male and female plants), one with large leaves, another with small ones, the former being *N. tabacum*, the latter *N. rustica*. De Serres says, "One holds that it is the Petum of the Americans" (the term "America" at that time referred to South America), and he speaks of the "male Petum, also called tabac,"—indications that he was familiar with Thevet's work, although he avoids his name. The fact that *N. tabacum* was cultivated in France in the latter part of the sixteenth century goes to prove that Thevet's claim is correct. This settles the Nicot-Thevet controversy in favor of an equal share of honor for both. But as *N. tabacum* is the more valuable of the two species and as a commercial type is now exclusively used in France as well as elsewhere, Gaffarel is right in linking the tobacco revenue with Thevet's name.

Nicot's influence at court appears to have been overwhelming in view of the cures which the new drug accomplished in the royal family. It is curious that Thevet never made the attempt to influence the court in his favor, although he was at a time chaplain of the queen-mother and historiographer and cosmographer of the king, subsequently curator of the king's curiosities ("garde des curiosités du roi").

The Tupi word *petun* (also spelled *petum*) introduced by Thevet from Brazil was still widely used in France during the seventeenth century, as expressly stated by Neander in his *Tabacologia* (1626), and still survives in Brittany and some other Départements as *betum*, *betun*, or *butun*. Paul Scarron (who died in 1660) even formed a verb *petuner*. In Edward Sharp-

ham's comedy *The Fleire* (1615) appears Signior Petoune, "a traveller and a great tobacconist," a character introduced as the type of the fashionable smoker of the time. In honor of Nicot, tobacco was called "herb of Nicot, herb of the ambassador." As Catherine of Medici, queen of France, used tobacco powder for headaches and was instrumental in propagating the cultivation, such names as "herbe de la reine, herbe médicée, and catherinaire" were temporarily in vogue. The Scotch poet, George Buchanan (1506-82), fired a sarcastic epigram in Latin at the queen for her attempt "to adulterate the Nicotian plant with the name of Medici." Unfortunately, worse adulterations of tobacco than that have since been perpetrated on this world. The designation "herbe du grand Prieur" is traced to the Great Prior of France and duke of Lorraine, who made the acquaintance of the plant as guest of Nicot at Lisbon and cultivated it in his garden at home in 1560; he delighted in taking snuff to the extent of three ounces daily, and as Liebaut states, propagated it in France more than any one else because of the great reverence he entertained for the divine effects of the herb.

The first French pamphlet on tobacco is entitled "Instruction sur l'herbe petun ditte en France l'herbe de la Royne ou Medicée: et sur la racine Mechiocan. Par I. G. P. Envie, d'envie, en vie. Paris, par Galiot du Pré Libraire iuré: rue S. Iaques à l'enseigne de la Galere d'or, 1572." The author's name is J. Gohorry, and his booklet of 32 pages is entirely copied from Monardes.

Molière, in his comedy *Don Juan, ou Le Festin de Pierre*, written in 1665, places the following eulogy of tobacco in the mouth of Sganarelle (Act I, Scene 1): "Whatever Aristotle and the whole philosophy may say, there is nothing equal to tobacco; it is the passion of the gentlemen, and he who lives without tobacco is

not worthy of living. Not only does it exhilarate and purify the human brain, but also it instructs the soul in virtue, and with it one learns to become a gentleman. Don't you know, as soon as one partakes of it, in what obliging manner one uses it with everybody and how delighted one is to give it away right and left wherever one may be? One does not even wait till it is requested, but one hastens to anticipate the wish of people, which shows how true it is that tobacco inspires sentiments of honor and virtue in all those who take it." The thought is similar to that expressed by Bulwer Lytton (*Night and Morning*, 1841), who says with reference to the pipe, "It ripens the brain, it opens the heart; and the man who smokes thinks like a sage and acts like a Samaritan."

In France tobacco first assumed the form of snuff. The king, François II, was treated with snuff against severe headaches by the queen-mother, and the courtiers hastened to imitate the practice. Snuff remained the only mode of taking tobacco on the part of gentlemen until the nineteenth century. In 1635, the free sale of tobacco was interdicted by Louis XIII. Only pharmacists were permitted to sell it for medical purposes on the prescription of a physician. In 1674 the cultivation, preparation, and sale of tobacco became a state monopoly.

The cultivation is now authorized in twenty-five Départements, but the cultivators are obliged either to sell their crops to the State or to export them. Whoever desires to cultivate tobacco must file an application to the Administration of Indirect Taxes, which furnishes the seeds and supervises the whole business. No one has the right to grow it without authorization; the prohibition is absolute, and even extends to flower-pots. The annual production amounts to 25 millions of kilograms. The preparation and manufacture are superintended by the General Direction of the Manu-

factures of the State (under the Ministry of Finance). The sale is directed by the Administration of the Indirect Taxes.

In Portugal, as stated (p. 49), tobacco was grown in 1558. Clusius travelled in Spain and Portugal for floristic investigations during 1560 and 1564-65, and reports (*Exotica*, 1601, p. 310) that he saw in Portugal the plant in blossom throughout the winter.

Nicotiana was first introduced into Spain as an ornamental garden-plant owing to its beauty, subsequently as a medicinal plant on account of its real or alleged virtues. This is clearly expressed by Doctor Monardes of Sevilla (1571) in the introduction to his brief treatise on tobacco, which has served as a model to many contemporaneous and later writers in all countries of Europe. "This herb commonly called Tabaco is a very ancient herb known among the Indians, chiefly those of New Spain. After taking possession of these countries, our Spaniards, being instructed by the Indians, availed themselves of this herb in the wounds which they received in war, healing themselves with it to the great benefit of all. A few years ago it was brought over to Spain, to adorn gardens so that with its beauty it would afford a pleasing sight, rather than that its marvelous medicinal virtues were taken into consideration. Now we use it to a greater extent for the sake of its virtues than for its beauty; and those certainly are such to evoke admiration."

The species described by Monardes is *Nicotiana tabacum*. The date of its first introduction into Spain is not exactly ascertained, various names and dates are suggested, but these accounts are not well authenticated; the exact date, moreover, is of no consequence, as Spain contributed nothing to the diffusion of the plant over Europe. Spain gave Europe only two things—the tobacco gospel of Monardes and the cigar. Monardes, it should be remembered, never was in

America, but gathered his information from the lips of voyagers and adventurers, who returned from the newly discovered land to Sevilla. The Spaniards never took to the pipe, but in accordance with the practice of the aborigines of the Antilles and Mexico adopted the cigar and cigarette. Monardes also describes the tubular pipes of Mexico, but these were used in the Spain of his time only for the purpose of obtaining relief from asthma.

Tobacco made its début in Italy under the sponsorship of two churchmen. It was first introduced into Italy in 1561 by Prospero Santa Croce from Lisbon in Portugal, where he was engaged on a diplomatic mission as nuncio of the Pope. He was made cardinal by Pius IV and died in Rome in 1589, at the age of seventy-six years. It is due to this early introduction that Mattioli in 1565 was able to describe the plant, which is *Nicotiana rustica* (above, p. 8). It then became known in Italy under the name *herba Santa Croce*. Castore Durante (*Herbario novo*, Rome, 1585, p. 227) writes, "At present it is found here in Rome in abundant quantity thanks to the illustrious and reverend Signor, the Cardinal Santa Croce, who brought it from Portugal to Italy." He devotes a lengthy notice to the virtues of the plant, but does not say that in his time the leaves were smoked in Italy.

Another introduction into Italy is due to Nicolò Tornabuoni, a great lover of plants. When he was papal nuncio and ambassador of Toscana at the court of France, he observed there the medicinal employment of tobacco and sent seeds to his uncle, the Bishop Alfonso Tornabuoni, at Florence. This was prior to 1574, as Cosimo I of Medici, who took a deep interest in the cultivation of the plant in Toscana, died in that year. In honor of its godfather, it was then christened *erba tornabuona*. This was *Nicotiana tabacum*. A dried specimen from this early period is preserved in

the Herbarium of Ferrara (1585-98), labeled *tabacho over Herba Regina* ("tobacco or herb of the queen").

While Italy thus received the plant from Portugal and France, it took an Englishman to teach Italians how to smoke. This distinction falls on the shoulders of the Cardinal Crescenzo, who about 1610 acquired the gentle art of smoking in England or, according to another version, from an Englishman, which practically amounts to the same. In accordance with this precedent smoking and snuffing were readily adopted by the clergy and laity as well. When complaints reached the holy see from Sevilla that both ecclesiastics and seculars smoked and snuffed in the churches during service, Urban VIII issued a bull excommunicating all who would take tobacco in any form in the porches or interior of the churches. The Catholic Church, however, has always been wisely tolerant toward the use of tobacco. An Italian proverb says: *Bacco, tobacco e Venere riducon l'uomo in cenere* ("Bacchus, tobacco, and Venus reduce man to ashes"). As in France and Spain, the manufacture and sale of tobacco are a government monopoly in Italy. Cigars are served in the Italian army as part of the daily rations. According to Penn, Italian cigars are "incredibly vile," and bad as are the cigars sold to the public by the Régie, the military ones are worse.

TOBACCO IN CENTRAL AND NORTHERN EUROPE

The English were the most active propagators of tobacco-smoking over many parts of Europe. We noticed their influence in Italy, but it was much stronger in Scandinavia, Holland, Germany, and Russia. English sailors and soldiers, students and merchants carried the pipe victoriously wherever they went. English students at the University of Leiden appear to have been responsible for the initiation of

smoking in Holland. William van der Meer, physician at Delft, who cultivated three species of *Nicotiana* in his garden, wrote in 1621 to Dr. J. Neander at Bremen that he did not become acquainted with pipe-smoking until the year 1590 when he studied medicine at Leiden and noticed the practice among English and French students; he tried to imitate them, but the experiment did not agree with him. At Hamburg which had commercial relations with England and Holland smoking was known at the end of the sixteenth century, and about 1650 the peasants smoked all over Germany. During the Thirty Years' War English soldiers propagated the habit as far as into Bohemia, whence it spread to Austria and Hungary. The older German form *toback* (in dialects still *tuback*) and Low German *smoken* (slang *schmockstock*, "smoking-stick," for a cigar) are witnesses of this early English influence. The plant itself was known at a much earlier date, probably through Huguenots emigrating from France, and is referred to in the correspondence of Konrad Gesner of Zürich in 1565. During the sixteenth century tobacco was cultivated in many parts of Germany, chiefly around Nuremberg, in Saxonia, Thuringia, Hessen, the Palatinate, and Mecklenburg. Tobacco was first introduced into Norway in 1616 when the country was ruled by Denmark and treated as a province of this state. Christian IV of Denmark prohibited the importation of tobacco into Norway in 1632, as he had learned that its use would do great harm to the subjects of his kingdom Norway. In 1643 he rescinded this order and levied a duty on tobacco imports. During the war period 1807-14 attempts were made to grow tobacco in various districts of the country. At present a few farmers along the west coast cultivate tobacco. In Sweden it was first planted in 1724 by Jonas Alströmer; at present it is but cultivated to a small extent in the neighborhood of Stockholm.

TOBACCO IN RUSSIA AND TURKEY

The story of the early fate of tobacco in Russia is well told by J. Crull (*Ancient and Present State of Muscovy*, 1698, p. 145) :—

“Formerly tobacco was so extravagantly taken, as the *aqua vitae*, and was the occasion of frequent mischiefs; forasmuch as not only the poorer sort, would rather lay out their money upon tobacco than bread, but also, when drunk, did set their houses on fire through their negligence. Besides (which made the Patriarch take a particular disgust at it) they used to appear before their images with their stinking and infectious breath; all which obliged the Great Duke, absolutely to forbid both the use and sale of tobacco, in the year 1634, under very rigorous punishments; to wit: For the transgressors to have their nostrils slit, or else to be severely whipt. Nevertheless, it is of late years more frequently used, than ever it was before since the time of the edict, the search being not now so strict against the takers, nor the punishment so rigorously executed. Foreigners having the liberty to use it, makes the Muscovites often venture upon it in their Company; they being so eager of tobacco, that the most ordinary sort, which formerly cost not above 9 or 10 pence per pound in England, they will buy at the rate of 14 and 15 shillings; and if they want money, they will struck their cloaths for it, to the very shirt. They take it after a most beastly manner, instead of pipes, they have an engine made of a cows-horn, in the middle of which, there is a hole, where they place the vessel that holds the tobacco. The vessel is commonly made of wood, pretty wide, and indifferently deep; which, when they have filled with tobacco, they put water into the horn to temper the smoak. They commonly light their pipe with a firebrand, sucking the smoak through the horn with so much greediness, that they empty the pipe at two or three sucks; when

they whiff it out of the mouth, there rises such a cloud, that it hides both their faces and the standers by. Being debarr'd from the constant use of it, they fall down drunk, and insensible immediately after, for half a quarter of an hour, when the tobacco having had its operation, they lep up in an instant, more brisk and lively than before, when their first discourse commonly tends to the praise of tobacco, and especially of its noble quality in purging the head."

It is curious to note in this account that the Russians of the seventeenth century availed themselves of the water-pipe the history of which is given in Leaflet 18. Presumably they derived it from Turkey. The Turkish word for tobacco, *tutun* ("smoke"), is encountered in all Slavic languages, as well as in Rumanian and Neo-Greek. It seems that at the same time the water-pipe was also fashionable in Germany. At least Georg Meister (*Der orientalische Kunstgärtner*, Dresden, 1692, p. 59), when he observed on his travels the hooka along the Arabian coast, remarks, "As is also done in our German lands by some tobacco-fellows à la mode."

Better days came for Russian smokers under Peter the Great (1689-1725), who during his sojourn in England and on the continent became an adept of smoking. He determined to introduce tobacco into his country for the sake of the revenue it would yield. The Marquis of Carmarthen on behalf of an English company offered £28,000 for the monopoly of the sale of tobacco in Russia. For this sum the syndicate was allowed to import one million and a half pounds of tobacco a year, and the czar agreed to permit its free use among his subjects, revoking all previous edicts and laws.

In 1698 Lefort and Golovin signed in London with Sir Thomas Osborne (1631-1712) a commercial treaty by virtue of which the latter was to receive the exclusive right to import tobacco into Siberia: up to 1699

he was to import three thousand tons, the following year five thousand, and from the third year onward six thousand and more, with the obligations to pay £12,000 on the first importation and to supply the court with a thousand pounds of tobacco of first quality annually. The English Consul, Charles Goodfellow, in Moscow was Osborne's agent. In 1705 this privilege was abrogated (cf. Leaflet 18, pp. 16-17). English tobacco was then prohibited in Russia, not, however, Turkish or Russian tobacco.

It is generally asserted that tobacco was introduced into Turkey in 1605 under the reign of Sultan Akhmed I (1603-17) ; but I have found a reference in J. T. Bent's "Early Voyages in the Levant" (p. 49) from which it follows that tobacco and smoking, at least from hearsay, must have been known to the Os-mans several years before that time, at the end of the sixteenth century. John Dallam, the organ-builder, when he travelled to Constantinople in 1599, tells a curious incident which happened at the time his ship met the Turkish navy not far from the Dardanelles. The Turkish captain of a galley boarded his ship and desired to receive as a present some tobacco and tobacco-pipes which were promptly granted to him. The Turk accordingly anticipated to find tobacco on an English vessel, and must have had some previous experience with the weed, which in all probability had reached Constantinople through the trade of the Levant Company of London. Indeed it was from England that tobacco was first introduced into Turkey, as we learn from George Sandys (*Relation of a Journey begun A.D. 1610. Foure Bookes containing a Description of the Turkish Empire*, 1615, p. 66). Sandys visited Constantinople in 1610 and writes thus: "The Turkes are also incredible takers of Opium, whereof the lesser Asia affordeth them plenty: carrying it about them

both in peace and in warre; which they say expelleth all feare, and makes them couragious: but I rather thinke giddy headed, and turbulent dreamers; by them, as should seeme by what hath bene said, religiously affected. And perhaps for the selfe same cause they also delight in Tobacco; they take it through reeds that have ioyned unto them great heads of wood to containe it: I doubt not but lately taught them, as brought them by the English: and were it not sometimes lookt into (for Morat Bassa not long since commanded a pipe to be thrust through the nose of a Turke, and so to be led in derision through the Citie,) no question but it would prove a principall commodity. Neverthelesse they will take it in corners, and are so ignorant therein, that that which in England is not saleable, doth pass here amongst them for most excellent." The English, accordingly, besides introducing tobacco, taught the Turks also how to smoke it from pipes. In 1615 Pietro della Valle observed the use of tobacco at Constantinople. At first it met with violent opposition on the part of the Sultans, and the most cruel punishments were meted out to smokers.

De Thevenot (*Travels into the Levant*, pt. 1, 1687, p. 60) tells how at the time of his sojourn in Constantinople the Sultan used to walk through the city in disguise to see if his orders be punctually observed. "It was chiefly for tobacco that he made many heads fly. He caused two men in one day to be beheaded in the streets of Constantinople, because they were smoking tobacco. He had prohibited it some days before, because, as it was said, when he was passing along the street where Turks were smoking tobacco, the smoke had got up into his nose. But I rather think that it was in imitation of his uncle Sultan Amurat [Murad IV, 1623-40], who did all he could to hinder it so long as he lived. He caused some to be hanged with a pipe through their nose, others with tobacco hanging about

their neck, and never pardoned any for that. I believe that the chief reason why Sultan Amurath prohibited tobacco, was because of the fires, that do so much mischief in Constantinople when they happen, which most commonly are occasioned by people that fall asleep with a pipe in their mouth, that sets fire to the bed, or any combustible matter, as I said before. He used all the arts he could to discover those who sold tobacco, and went to those places where he was informed they did, where having offered several *chequins* for a pound of tobacco, made great entreaty, and promised secrecy, if they let him have it; he drew out a cimeter under his vest, and cut off the shopkeeper's head." From about 1655 the prohibition was relaxed, and smoking both from the dry pipe and water-pipe became a general custom. In 1883 a government tobacco monopoly was introduced: the cultivation is free, but the crops must be sold to the government, which conducts the sale.

Dr. Covell, while on a journey to Adrianople, writes in his Diary under May 2d, 1675, "Here in summer many come to take their *spasso* and recreation in the shade, sitting upon carpet with tobacco, coffee, and pure water," etc. In Bourgas (modern Lule-Bourgas) he mentions shopkeepers selling the finest tobacco-pipe heads that are to be found in Turkey (Bent, Early Voyages in the Levant, p. 173).

The following interesting account is taken from H. Phillips (History of Cultivated Vegetables, 1822, an undeservedly forgotten book):—

"The smoking of tobacco is carried to such an excess by the Turks, that they are rarely to be seen without a pipe, and never enter into business without smoking, which often gives them an advantage over the Christians with whom they have either commercial or political transactions, as they smoke a considerable time and reflect before giving a reply to any question.

To visit them on business previously to their morning pipe, would only subject the intruder to their caprice and ill-humor. An ingenious friend, who has resided several years in Constantinople, and had opportunities of associating with the higher classes of that city, assures us that two thousand pounds is no uncommon price for a Turk to give for the amber mouth-piece of a tobacco-pipe, exclusive of the bowl or the pipe, the latter of which is made of a branch of the jasmine tree, for the summer use, while those for winter smoking are uniformly made of the branches of the cherry tree. In order to obtain them of a regular size without being tapering, the young shoots of these trees have a weight affixed at their extremities to bend them downwards, which prevents the sap from returning to the body of the tree, and causes them to swell equally in all parts. The rind or bark is carefully preserved to prevent the escape of the fumes through the pores of the wood. The wealthy Turks pride themselves on the beauty and number of their pipes; and the principal servant in their establishment has no other charge than that of attending to the pipes and tobacco, which are presented to the master or his guests by a servant of an inferior rank. These pipes are so regularly and effectually cleaned, as always to have the delicacy of a new tube, while the German pipe, on the contrary, is enhanced in value by the length of time it has been in use. We are told by the same friend that he has seen among the lower class of Armenians and Jews in Turkey, some smokers who could consume the whole tobacco of a bowl twice the size of those used in England, and draw the entire fumes into their bodies at one breath, which they discharge from their ears as well as the mouth and nostrils."

The world-wide diffusion of tobacco is one of the most interesting phenomena in the recent history of mankind and one that furnishes food for many reflections. Within the short span of three centuries tobacco has firmly established itself as a universal necessity without which mankind is unwilling to live. It has developed into one of the greatest industries of modern times, resulting in statistical figures which almost stagger imagination. Let us consider also that during the same brief period coffee, tea, and chocolate obtained a strong footing in European and American society, and likewise are now articles of international industry and commerce. None of these stimulants was known to our ancestors of three centuries ago, and now they form an integral part of world economy. The association of coffee with tobacco is very close, and their alliance has stimulated and promoted thought, scholarship, literature and art; it profoundly affected social customs, intensified sociability, and paved the way to the era of humanism.

Of all the gifts of nature, tobacco has been the most potent social factor, the most efficient peacemaker, and a great benefactor of mankind. It has made the whole world akin and united it into a common bond. Of all luxuries it is the most democratic and the most universal; it has contributed a large share toward democratizing the world. The very word has penetrated into all languages of the globe, and is understood everywhere.

B. LAUFER.

BOOKS RECOMMENDED

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On the History and Migration of Cultivated Narcotic Plants in Reference to Ethnology

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VIII.—*On the History and Migration of Cultivated Narcotic Plants in reference to Ethnology.* By J. CRAWFURD, Esq., F.R.S.

[*Read Feb. 25th, 1868.*]

TOBACCO, although unknown to civilised man before the first voyage of Columbus, is now, perhaps, the most universally consumed of all cultivated plants. Botanists reckon no fewer than forty species of the genus to which it belongs, *Nicotiana*, all of them having more or less of a narcotic quality. Tobacco owes its universality of consumption to the vast area over which it can be cultivated, extending from the equator to the fiftieth degree of latitude,—to the facility with which the plant can be reared; and, above all, to its narcotic property. These qualities make it a cheap, seductive, and accessible luxury to persons of every condition of life and with every race of man.

The almost universal name by which tobacco is known, at least among the nations of the Old World, is the Spanish one, *tabaco*, but from what source the Spanish word itself is taken, is very far from being ascertained. The *Dictionary of the Royal Academy of Spain* derives it “from the name of the province where it grows, or from that of an island on the coast of South America.” This, however, is vague and unsatisfactory; for there is no province of America called *Tabaco*, which is the Spanish form of the word, nor island so called on the coast of South America. *Tobago*, which is 16° north of the equator, is the island here alluded to; but the Spaniards, who had discovered in 1492 the great islands of Cuba and Hispaniola, where they found the inhabitants using tobacco, are not likely to have waited four years to give it the name of a little island which they did not discover until 1496. Las Casas and Charlevoix take it from the name of the pipe, with which the plant was smoked, in the language of the Caribs of Hayti; and as the inhabitants of this island were among the first American people seen by the Spaniards and making use of the plant, this etymology has an air of probability, although it is not easy to understand how the instrument with which the plant was used, came to be mistaken for the plant itself. The probability is that, in the many native languages of America, tobacco had as many different names as there were tongues; and we may judge of the number of these when we see that

Columbus found the plant cultivated and used in Hayti, Cortez in Mexico, the Portuguese in Brazil, and Raleigh in Virginia. The writers of the sixteenth century were not curious in etymology, or we should have been better informed on the subject.

The Spaniards, as the first discoverers of America, must necessarily have been the first Europeans to learn the use of tobacco from the natives. The companions of Columbus or of Cortez may have introduced it into Spain, but there is no record of its first introduction into that country. In the year 1560, sixty-eight years after the discovery of America, one Jean Nicot, whose name is recorded in the technical name of the plant, acting as an agent of the King of France in Portugal, procured at Lisbon, from a Dutchman, some tobacco-seeds, which the latter had brought from Florida. Whatever may have been the case in Spain, the plant seems at the time not to have been cultivated in Portugal, or we should not have seen a French agent obtaining its seeds from a Dutchman who had brought them direct from America. The seeds so obtained by Nicot he sent to France, and from them plants were raised. This fact is a record of the first introduction of the culture of tobacco in France.

Sir Walter Raleigh, on his return from his first voyage to Virginia, in 1586, is supposed to have been the first to have introduced tobacco, and the practice of smoking it, into England. If so, the plant was not known in England until twenty-six years after it was known in France, and not until ninety-four years after the discovery of America. King James's celebrated *Counterblast to the Puffs of Tobacco*, although said to have been printed earlier without a date, was published in the collection of his works in 1616, only thirty years after the supposed introduction of the plant by Raleigh; and to judge by the language used by the king, its use must have made very rapid progress in this brief time. "Now," says his Majesty, "to the corrupted baseness of the first use of this tobacco doeth very well agree with the foolish and groundlesse first entry thereof into this kingdom. It is not so long since the first entry of this abuse amongst us here; as this age cannot yet but very well remember both the first author, and the form of the first introduction of it amongst us. It was neither brought by king, great conqueror, nor learned doctour of phisicke." "Now, how you are by this custome disabled in your goods, let the gentry of this realm bear witness; some of them bestowing three, some four hundred pounds a-year upon this poisonous stinke, which, I am sure, might be bestowed upon many far better uses." "And for the vanities

committed in this filthy custome, is it not both great vanitie and uncleannesse that at the table,—a place of respect, of cleannesse, of modestie,—men should not be ashamed to sit tossing of tobacco-pipes, and puffing of the smoke of tobacco one to another, making the filthy smoke and stinke thereof to exhale athwart the dishes, and infest the aire when, very often, men that abhor it are at the repast? Surely smoke becomes a kitchin farre better than a dining chamber; and yet it makes a kitchen oftentimes in the inward parts of men, soyling and infesting them with an unctuous and oily kind of soote, as hath been found in great tobacco takers, that after their death were opened. And not only meate times, but no other time or action is exempted from the publicke use of this uncivil tricke. Moreover, which is a great iniquity, and against all humanity, the husband shall not be ashamed to reduce thereby his delicate, wholesome, and clean complexioned wife, to that extremity that either she must also corrupt her sweet breath therewith, or else resolve to live in a perpetual stinking torment.”

His majesty's diatribe concludes with the following peroration:—"Have you not reason, then, to be ashamed, and to forbear this filthy noveltie, so basely grounded, so foolishly received, and so grossly on the right use thereof? In your abuse sinning against God, harming yourselves both in persons and goods, and raking also thereby the markes and rites of vanity upon you by the custome thereof, making yourselves to be wondered at by all forrein civill nations, and by all strangers that come among you to be scorned and contemned. A custom loathsome to the eye, hateful to the nose, harmful to the braine, dangerous to the lungs, and in the black stinking fume thereof, nearest resembling the horrible Stygian smoke of the pit that is bottomlesse."

If King James's statement, that the gentry of England spent three and four hundred a year on tobacco, and indulged in smoking during meal times, be not exaggerated, the use of the weed in the age of the "*Counterblast*" must certainly have risen to the height of a public nuisance, and they must have been at the time the greatest smokers in Europe, while we are certainly not so now. But it is certain, however, that there must be much colouring in his majesty's representation; and one cannot help thinking that his indignation against tobacco had some connexion with his hatred of Sir Walter Raleigh, whom he evidently points at as the party who first introduced the use of the plant, and to whose execution he gave his sanction in the very year of the publication of the *Counterblast*.

Notwithstanding King James's denunciation of tobacco, its

consumption in England went on increasing ; and it is singular enough that Virginia, a colony specially patronised by the king himself, became, even in his own time, our chief source of supply. The culture of the plant was introduced into England, but prohibited by the king, and during the Commonwealth wholly suppressed.

James the First was not the only sovereign who attempted to stem the consumption of tobacco ; for the Moghul emperor Jehangir is said to have gone the length of publishing edicts against it, as did the contemporary of both, the emperor of Japan. But a weed, the use of which was borrowed from the savages of a New World, has defeated all their attempts at its suppression ; and the use of tobacco has been now established among all the nations and tribes of the earth for two hundred and fifty years.

Religion has been somewhat more effectual than imperial edicts : the founders of some new creeds have prescribed abstinence from it as a test of adherence to their tenets. The Sikhs—not indeed in the time of the founder of their religion, for that preceded the discovery of America, but after tobacco was in full use by the Hindus—prescribed forbearance from it as an indispensable tenet ; and the Wahabi Arabs were still more rigid ; for the use of it is pronounced to be a more heinous sin than robbery or assassination. This ascetic reformation of Mahomedans by the Arabs was conveyed by Malay pilgrims, as far as the remote island of Sumatra, and there produced a civil war ; but here again tobacco was victorious, and the heresy which forbade its use suppressed.

Tobacco was unquestionably first made known to the nations of Asia and Africa through the people of Europe. The name of the plant is, with rare exceptions and trifling modifications, the Spanish one. According to Mr. Lane, the modern translator of *The Arabian Nights*, the plant was introduced into Turkey, Arabia, and Persia, about the beginning of the seventeenth century, or better than a century after the discovery of America. There is no record of the time in which tobacco was first introduced into Hindustan : there can, however, be little doubt that it was effected by the Portuguese. The plant is not named in the *Memoirs of the Emperor Baber*, who died in 1550,—that is 52 years after the first arrival of the Portuguese in India ; although Baber names several remarkable plants of the country new to himself, as a foreigner. Down to this time, therefore, it had not been introduced into India. Java is the only eastern country in the annals of which there exists a record of the first introduction of tobacco, and

this event is stated in them to have taken place in A.D. 1601. In all the languages of continental India, as well as in those of the Malayan and Philippine Archipelagos, the Spanish name, with inconsiderable modifications, is tobacco. There is, however, one whimsical exception. The popular language of Java has the usual name ; but in the Court dialect, which is what may be called a factitious tongue, the name is *sata*, literally “the game-cock.” In the monosyllabic languages of all the nations which lie east of India, the Chinese included, we cannot expect that a trisyllabic word should find admittance, and hence the name which tobacco bears in these is an invented one, having some reference to its quality or use. Thus, in Siamese, it signifies “medicine”, and in the Chinese “smoke”. We have no account—with one exception, which I have above mentioned—of the first introduction of tobacco into any of these countries ; but there can be no doubt that the Portuguese were the instruments, for their influence in all these quarters began about the commencement of the sixteenth century, and lasted until about the end of it. Whether in Europe, Asia, or Africa, it seems to have taken a full century, from and after the discovery of America, before tobacco became known : once known, however, its consumption spread with a rapidity beyond precedent in any other commodity. The use of this narcotic is, indeed, the sole arbitrary custom, in which all the races of mankind agree.

It is curious and instructive to reflect on the vast quantity which is now consumed of a commodity unknown to the Greeks and Romans, as well as to the Persians, Arabians, Hindus, and Chinese of antiquity,—which was unknown, indeed to the great majority of mankind two centuries and a half ago. We are ourselves by no means the largest consumers of tobacco ; for we are exceeded by nearly all the nations of the continent of Europe, and by all the colonies of European nations. These are again surpassed by the oriental nations, who grow their own tobacco at a very small cost, and among whom it is in use often by both sexes, in youth as well as in old age. Our own yearly consumption at present is near 40,000,000 of pounds, or close on 18,000 tons, which gives rise to a foreign trade of the value of £3,300,000 ; while this mere exotic weed is the instrument by which £6,000,000 of our revenue are conveniently levied. Let us suppose the rest of the world to consume in the same proportion, taking the population at its usual estimate of twelve hundred millions, and the yearly consumption of this product of the New World, once grown and used only by savages, will amount to the enormous quantity of 78,666 tons,—a quantity the bare transport of which would

occupy about one-seventh part of the whole registered tonnage of the United Kingdom.

Our consumption of tobacco is greatly on the increase. Taking round numbers, our consumption in 1821 was 15,600,000 pounds, with a population of 21,000,000, giving an average consumption per head of nearly twelve ounces. With our present population of 30,000,000, the average per head is nearly twenty ounces; so that in little more than forty years' time our consumption has increased by better than 66 per cent., or in other words, it is by two-thirds more than it then was.

As to the effect of the use of tobacco on health, my own conviction is that it is neither salutary nor hurtful, but wholly indifferent. Like all narcotics and stimulants, it is liable to be abused by excess; but with the exception of tea and coffee, it may be safely said to be less so than any other commodity of corresponding character. The sanitive condition of the nations of Europe has, at all events, improved since they began the use of it, so that it cannot at least be said to have proved seriously detrimental.

The next subject which I shall consider is opium, and this without reference to its medicinal use, and only as a subject to produce intoxication in substitution of fermented and intoxicating liquors. Opium, as is well known, is the inspissated juice of one species out of twenty-five of the genus *Papaver*, or poppy. This is the *Papaver somniferum* of botanists, of which there are two cultivated varieties,—one with white and one with red flowers, both equally yielding opium. The drug is obtained from the capsules by making incisions in them in the evening, when the milk-coloured sap which exudes becomes the brown rob, which is scraped off in the morning. This is opium in its purest but semifluid state. The culture of the opium-poppy requires a good soil, some manuring, not otherwise frequent in Asiatic husbandry, with much careful weeding. This with the laborious manipulation necessary for taking the crop, accounts for the high price of the drug. The culture, indeed, can only be successfully conducted in a densely peopled country, where the wages of labour are low; and hence it has never been carried on in any European colony, even where soil and climate would be well adapted to it, as in many parts of America, of Australia, and of New Zealand.

The opium-poppy is thought to be a native of the warmer parts of the temperate western Old World, and is supposed to be there indigenous; more especially in Egypt, Asia Minor, and Persia, countries in which it is still cultivated for its prepared sap. The plant was, most probably, first cultivated for

its seed, to be used as food, or for its oil. We can, indeed, readily believe that the seeds of the wild poppy would be among the earliest vegetable food of primeval man. It is likely that the collection of the sap, as less obvious, would be a much later discovery.

The countries in which the poppy is at present cultivated for the production of opium, are Egypt, Asia Minor, Persia, and subtropical India, with, in very late years, subtropical China. Unless with a considerable elevation of land, the poppy cannot be cultivated within the tropics for the production of opium. Even in Northern and Central India, and in China, it can only be cultivated for this purpose, because, as an annual, a crop of it can be obtained in the winter months, corresponding to the summer of the countries in which it is indigenous.

Opium is first mentioned by two writers of the first century of our era, Pliny and Dioscorides. Pliny's definition of opium is so correct, that it is evident he was well acquainted with the source from which it was derived. His description is, "*Papaveris succus densatus*", or poppy-juice thickened or inspissated. The Greek name *opion* comes from *opios*, a vegetable sap, and has had a very wide extension; for it reaches as far to the east as it does to the west. Thus, in Arabic we have it as *afyun* or *abyun*; the letter *p* not existing in this language, another labial is substituted for it. The Persians appear to have no native name for opium, and employ the same name as the Arabs, replacing the Greek labial. From the Persian, the word has been adopted by all the languages of India, and by the Malayan languages. But both the Arabs and Persians have another name for opium: this is *tariak*, which, however, is but a synonym, the word signifying "treacle", a name evidently given to the semi-liquid drug from its close resemblance to this commodity. That the Persians borrowed both these names from the Arabs is to be inferred from their containing letters which are peculiarly Arabic, and which are not to be found in any purely Persian word. As to the European names, they are all directly or indirectly from the Greek, as the Latin *opium*, and this without change in French and English; in Italian *oppio*, and in Spanish *opio*.

The probability is that the Greeks acquired their first knowledge of opium from Egypt, and that it was through them that a knowledge of the drug was extended to the Arabs, most probably by translations or paraphrases of Greek works on *Materia Medica*. If this was the case, it would follow that the knowledge of opium was communicated to the oriental nations in comparatively modern times; that is, in the seventh and

eightth centuries, when the conquests of the Arabs, in a westerly direction, brought them into communication with the Greek Empire. If the practice of opium-eating had been as notorious among the ancient Persians as it is now among modern Persians and Turks, the Greeks, who had so much communication with them, must surely have alluded to the practice, which they have not.

There can be no question that the Hindus received the opium-poppy, whether for its seed or sap, from the Persians. Of the twenty-five species of the genus to which the opium-poppy belongs, there is but one within the wide bounds of India which is a native, and this belongs to the Himalayas. In Hindi, the name for the opium poppyhead, or flower, is *post*, and this is one of its Persian synonyms. Its name in Sanskrit is *chosa*, which Dr. Boyle supposes, and I think fairly, to be a mere corruption of the same word. For opium itself, that language has no name; from which we must infer that the drug was unknown to those whose vernacular tongue was Sanskrit.

At what time the culture of the opium-poppy was first introduced into India there is, as in all such cases, no record. It was not, however, likely to have happened until after the Turks and Persians, who invaded Hindustan in the first year of the eleventh century, had been tolerably well established in their new conquest, which would not have been the case earlier than the twelfth century. In the early years of the sixteenth century, the trustworthy Portuguese traveller, Barbosa, in describing the trade of Malacca, which he visited, enumerates opium as one of the commodities which the Arab and Hindu merchants brought to that emporium, there to be exchanged for Chinese goods with the junks of China. He states that some part of the drug was brought from Aden, in Arabia, and some also from Cambaye, in India, which was made there. The first was probably the produce of Syria, or what we now call Turkish opium; and the last what is known in commerce as Malvoah opium. Barbosa even mentions their respective prices, making the Arabian or Turkish more valuable than the Indian by thirty-three per cent., or about one-third part.

The consumers of opium as a luxury, and in room of intoxicating potables, are the Turks, the Persians, the Malayan nations, but far above all, the Chinese. Its use among the Turks,—I state this on the high authority of Lord Strangford, familiar with their language and themselves above all Englishmen,—decreases in proportion as the consumption of wine increases. My friend, Sir Justin Shiel, so long our representative

in Persia, tells me that opium is much consumed by the Persians, and, by long habit in some instances, in almost incredible quantities.

That opium was unknown to the Chinese before their intercourse with the people of the west, is implied by the names they give to it, namely, "foreign smoke" and "foreign earth", and "dirt-smoke", with occasionally such approach as they can make to its usual name, *yapeen*. But at what time the Chinese first began to use opium as a luxury, we have no account. As already shown, however, it had been brought both from Arabia and India to the emporium of Malacca, for their use, in the early years of the sixteenth century. It seems at that time, however, to have been an established branch of the trade of that emporium; and the consumption of the drug by the Chinese was most likely of much earlier introduction, probably even coeval with the commencement of the commercial intercourse of the Arabs with China. Its use, however, could not have been general, and therefore conspicuous at the end of the thirteenth century, or it would have been mentioned by Marco Polo, who does not notice it.

The common hemp, the *Cannabis sativa* of botanists, is the only species of the genus to which it belongs that contains a narcotic principle, and this is very powerful when the plant is the produce of a warm climate. It is considered to be a native of most parts of temperate Europe and Asia, and is found wild in the Himalaya mountains. Of all cultivated plants, it seems to have the widest geographical range; for it grows freely in Sumatra under the equator, and flourishes in Russia up to the 66° of latitude. Thus, the celebrated navigator, Dampier, recognised an old and familiar acquaintance in a field of it near Achin, in Sumatra. An Indian name was given to it; but he insisted, and he was right, that the plant before him was but homely hemp.

In Europe, hemp is cultivated only for its valuable fibre; but in Asia seldom or never for this purpose, and only for its narcotic juice. The practice of using it as a narcotic seems to have had its origin with the Hindus, who still continue to be its principal consumers. The plant bears different names in the different languages of India, from which it may be inferred that it is indigenous, or at all events immemorially an object of culture from the Himalaya mountains to Cape Comorin. In Sanskrit it is called *bijaya*, a name which has not been adopted in any of the vernacular tongues. In Hindi, the prevailing tongue of Northern Hindustan, it has at least three names, *patti*, *sidaya*, and *bhang*, the last by far the most current. In the Telugu or Telinga lan-

guage the name is *ganja*, and in the Tamil we have it as *shumul*.

From India, the use of hemp to produce intoxication was extended to Persia; and from what quarter of it the Persians received it may be inferred from its name in their language, which is the most popular one of Northern Hindustan, the Hindi word being written *bang*, without the aspirate. This would imply a comparatively modern introduction; because if it had been an ancient one, the word would have been the Sanskrit one in its integrity, always, however, supposing the latter to have been a genuine and not a factitious term, the invention of the Bramins.

Wherever the Hindus have settled, their inclination is to carry with them the use and even the cultivation of hemp. Thus they have, as already alluded to, introduced it into Sumatra. I have myself seen it cultivated in Java; and I find they have also introduced it into the country of the Burmese. Of none of these countries is hemp a native plant; and the only name by which it is known is *ganja*, a word, as already stated, of the language of the Telugus, the most active of the Hindu emigrants from India. I have not heard that the Coolies, or Indian labourers, who have within the last thirty years emigrated to the Mauritius and the Antilles, have as yet introduced the cultivation of hemp into these countries, where it would certainly grow as freely as in Java and Sumatra; but for their use, there is a considerable exportation of the article from Bengal.

Mr. Lane, in his *Manners and Customs of the Modern Egyptians*, tells us that the Arabs acquired the practice of using hemp to produce intoxication from the Persians, which, however, is not to be inferred from etymological evidence; for the name of the plant, which the Persians had taken from the Hindus, has not been adopted in the Arabic, which has several names of its own for it, among which is *kanab*, which seems only a corruption of the Greek *cannabis*. According to Mr. Lane, the name for an habitual hemp-eater or smoker is *khashish*, the plural of which is *khashishén*, and it is the origin of the word *assassin*, which has had so wide an acceptance in the languages of Europe. The Crusaders found the practice of producing intoxication by hemp among their Saracen enemies in Syria, and imagining that it was the practice of the Arabs to drug their enemies, the more safely to destroy them, they gave the name of the habitual hemp-smokers or hemp-eaters to secret murderers. Mr. Lane observes, that the practice of using hemp to produce intoxication was introduced into Egypt towards the middle of the thirteenth century; but as it was familiarly

known to the Arabs, the masters of Egypt, during the Crusades, which lasted from the end of the eleventh to the beginning of the thirteenth century, an earlier date must be ascribed to the introduction of the practice into Egypt.

The narcotic quality of hemp was well known to the ancients, and is mentioned by Herodotus and Galen; but the practice of using it to produce intoxication has never gained root in Europe, probably on account of the feeble inebriating quality of the hemp of temperate regions, for in this respect it resembles the opium-poppy.

The parts of the hemp chiefly used to produce intoxication are the leaves and capsules, which are bruised, mixed with water, and eaten, or in a dry state smoked in a pipe. A concreted exudation from the glands of the plant, known to the Hindus of Upper India under the name of *charris*, contains the intoxicating principle in a more concentrated form than the leaves, and is much esteemed. The inebriation produced by hemp is more agreeable to the Hindus than that produced by opium, and consequently the latter is little used by them for the purpose.

BETEL.—Among the stimulants in universal use among a large portion of mankind, is the betel preparation. The ingredients of this masticatory are the leaf of the betel-pepper, the fruit or nut of the Areca palm, catechu or gambir, as the case may be, and a little slaked lime. The use of this mixture is general with both sexes throughout Hindustan, the Malay and Philippine Archipelagos, the Indo-Chinese countries, the southern provinces of China: as far as we know, such has been immemorially the case.

The most essential of the ingredients now named is the leaf of the betel-pepper, and as this can be used only in its fresh state, the consumption of the preparation is bounded by the geographical limits within which the plant is capable of being cultivated. The betel pepper, the *Piper betlé* of botanists, is probably a native of tropical countries, and of these only. It is cultivated, however, beyond the tropic and up to the twenty-eighth degree of latitude, but in this case only with much care, for the plant requires irrigation, and has to be grown under a thatched roof to protect it against the scorching heat and drought of the summer. It is here grown, in fact, as the exotics of warm climates are grown with ourselves, only that the protection required is in one case against cold, and in the other against heat.

The name of the betel-pepper in Sanskrit is *tunbol*, and in Hindi, *nagled*, but the leaf, as distinguished from the plant, is called *pan*. The Persian name of the plant is *tunbol*, evidently

derived from the Sanskrit. In Tamil, the name is *Vitli*; and in Telugu *betré* or *bellé*, the same word with a trifling difference of form. From one or other of these two words the European name is derived. In the languages of the Malayan Archipelago, we find each tongue to have its own special name for the betel. Thus in Malay it is *sireh*, in Javanese *sura*, in Balinese *basé*, in the language of Ternate *bido*, and in that of Amboyna *amo*. This frequency of distinct names in the Malayan languages would seem to imply that the betel-pepper is an indigenous plant in many parts of the country, and Rumphius, indeed, asserts that it is found wild in several of the islands of the archipelago. With whom the strange practice of using the betel masticatory originated it would be difficult to say; but we may at all events be tolerably certain that it began in a tropical country, and that in time it extended beyond them.

With respect to the second most important ingredient, the Areca, the palm which yields it is the *Areca catechu* of botanists, a tropical plant, and like the coco palm, limited in its growth to a short distance from the sea. The names by which the areca palm is known, point at the localities which are native to it. In Malay it is called *pinang*,—a word familiar to us by its giving name to the well-known British settlement in the Straits of Malacca. In Javanese its name is *jambi*, which has been given by Javanese settlers to a native state of Sumatra, from which locality, and written *jambee*, it found its way into the English language, Dr. Johnson defining it, on the authority of *The Tatler*, as “a name formerly for a fashionable sort of cane.” In the Macassar language of Celebes, it is *rapo*, and in the Balinese *banda*. In the dialect of Amboyna, the name is indifferently pronounced *pua* and *kuah*, which seems to be a corruption of the Malay word *buah*, signifying “fruit”. In the Tamil, the most southerly language of continental India, the name is *paku*; in the Telugu it is *areka*, the name adopted by the European languages. In the language of Bengal, the name is *supari*, and it is the same in Hindi, while in Sanskrit there is no name for it, from which we may, perhaps, infer that the people, of whom the Sanskrit was the vernacular tongue, were ignorant of the betel preparation. Unlike the leaf of the betel-pepper, which is never used but in its fresh state, the fruit of the areca, although where it grows it is always used fresh, is also used in its dry state, and it is hence a large article of exportation to countries of which the areca palm is not a native; and more especially to Upper India and China, the Island of Sumatra affording in this commerce the largest supply.

Previous to the discovery of America and the introduction

of tobacco, the habitual stimulant of the people of tropical Asia was the betel preparation, which seems to have some narcotic quality, probably derived from the betel-pepper.

The third ingredient in the betel preparation is a vegetable astringent, which used to go under the name of *Terra Japonica*, a term which embraced two mistakes,—that the substance was an earth, and that this earth was the product of Japan. The vegetable astringent in question is known in commerce under two different names; namely, *catechu* and *gambir*, which are the products of two distinct plants. The catechu is produced by a species of *acacia*, which takes its trivial name from it. This is a wild forest-tree, and the catechu is obtained by boiling and inspissating the inner wood. The tree has a wide geographical range; for it is found all over Continental India, and the Hindu-Chinese countries. In Hindi, the name for catechu is *kath*, and in Malay *kachu*, and from one of these, most probably from the latter, comes, by some odd corruption, the catechu of the *Materia Medica*, and the *cutch* of commerce.

Gambir is the product of a species of *Nauclea*, to which it gives its trivial name. It is a tall shrub, now extensively cultivated, but of limited geographical range; for it is confined to the Malay Peninsula and the islands immediately adjacent to it. The product is obtained by boiling and inspissating, not the wood but the leaves. The name is pure Malay and that of the plant; and to complete it for that of the extract, the word *gâtta*, gum, or inspissated sap, has to be prefixed.

Of late years, both catechu and gambir, formerly used chiefly as a masticatory by the Oriental nations, and to a trifling extent by Europeans medicinally, has been largely employed in the arts, as a substitute for oak-leaves, and become a considerable article of trade, the extent of which may be judged by our own importations, which at present exceed 2,000 tons of catechu, and 10,000 tons of gambir.

With what people the practice of chewing the betel preparation, for it is confined to mastication, originated, it is difficult to say. We may, however, be certain that it did so where the two main ingredients, the betel-pepper and areka-palm, are indigenous, and therefore readily procurable. This would restrict us to the southern part of India and the western parts of the Malayan Archipelago; and it is in these two regions that the practice is at present most prevalent. It is rarely used in Upper India, and unknown in Persia and Northern China. It appears most probable that the practice originated with the people of southern India, and that it was they who introduced it among the Malayan nations at the time they introduced the Braminical religion, with a considerable amount of the sacred

language of the Bramins. For this hypothesis, however, there is certainly no philological evidence, the names for all the ingredients of the preparation being different in all the languages,—a fact, perhaps, to be accounted for by the plants yielding them being everywhere indigenous, and consequently bearing everywhere a native name, for which the substitution of a foreign one would not be called for.

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The God in the Flowerpot

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The God in the Flowerpot

MARY BARNARD

HERE IS A CACTUS PLANT in a flowerpot; it is small, spineless, grayish, apparently inedible and hardly a thing of beauty by any aesthetic standard. The botanist would recognize it as *Lophophora williamsii*. The scientist engaged in pharmaceutical research might identify it as a source of the drug called mescaline. Wyoming Indians refer to it among themselves as "the medicine," using that word in its double meaning as a cure for illness and a source of supernatural power. The Tarahumara Indians of Mexico call it *hikuli*, and the Aztecs called it *peyotl*. To the white men who are familiar with it, the peyote cactus is a plant containing an interesting assortment of alkaloids in varying proportions. To the Indians who use it in religious ceremonies it is often more than a "medicine," it is a god. The plant, which has a limited range in extremely arid, almost uninhabited country along the Mexican border, is the object of annual pilgrimages by the Tarahumara, who must make a journey of several days on foot to collect it. Oklahoma and Wyoming Indians import the dried "button" or raise peyote in pots. Whenever possible it is eaten fresh, without preparation; the dried button may be powdered, pounded into paste or made into tea. The god, being rendered fit for eating, presides over the meeting where peyote is taken and "sends" the songs sung and the visions seen by the members who partake of this sacrament. The peyote cult is not based on a written or spoken Word, but on the experience of the members during the communion.

My hypothetical flowerpot might have contained any one of a dozen plants, for instance, the Texas mountain laurel whose seeds are known as "mescal beans," several varieties of *Datura* including

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the jimsonweed of the American Southwest, certain lianas of the South American forests, a kava (awa) plant from Polynesia, the soma of ancient India, the haoma of the Parsis, the coca of Peru, or Indian hemp—the source of marijuana and hashish. The opium poppy would probably not be out of place. Several species of hallucinogenic mushrooms belong in the list, or would belong if they could be induced to grow in pots. I have used the American peyote because it is perhaps the most thoroughly documented of all these plants, none of which is valued for its vitamins or caloric content. All are drug plants: they inebriate, soothe pain or function as mind-changers. Some of them are open doors to the otherworld, and as such they have religious uses. They are sacred plants, magic herbs or shrubs, magic carpets on which the spirit of the shaman can travel through time and space. Like shamanism, which has been described as a religious technique rather than a religion in itself, the magic plants are vehicles for a special kind of experience adaptable to the use of most religions that acknowledge an otherworld and permit its exploration.

If there were such a field as theo-botany, the study of these plants and their cults would be work for a theo-botanist. As it is, little has been published in the way of comparative studies, perhaps for the very good reason that the scholar who attempts such a study must step out of his own field into four or five others, and thereby risk his reputation. Laymen, therefore, who have no prestige to lose, burst in where scholars fear to tread, and here am I. My own interest is in the mythology of the drug plants, and my approach has been by way of mythology, a study as perilous to the scholar as theo-botany. The hazards have therefore seemed less and the facts, such as we have, reassuringly firm. My approach to the subject was inadvertent, almost accidental; my experience that of one who has been treading water interminably and feels solid ground beneath his feet at last. Half a dozen important mythological themes—the shaman's journey, the food of immortal life, the food of occult knowledge, the fate of the disembodied soul, the communication with the dead, plant-deities—all converge on this point: that is, on some actual food (usually a drug plant) ritually consumed, *not* symbolically but for the experience it confers. Most of these drug

plants are what Aldous Huxley calls "mind-changers." The experience differs according to the drug or mixture of drugs and alcohol taken by the shaman, the initiate or the communicant whoever he may be. He may fall into a coma lasting for a day or more; he may be awake, but anesthetized; his mind and body may be stimulated to wakefulness and fatigue dispelled so that he can perform feats of endurance quite impossible without the assistance of the drug. He may experience color visions of varying intensity. Euphoria, quickened or dulled sensation, a displaced center of consciousness seemingly *outside* the body, a sense of enormously protracted time and extended space, and a feeling of weightlessness, of escape from the forces of gravity, are among the possible effects. Usually the communicant fasts for a day or longer before taking the peyote, soma, mushroom or extract of jimsonweed. One good reason for the fast is of course the quicker and more powerful action of the drug on an empty stomach.

Bearing these facts in mind, let us return to the peyote and its mythology. So far as I know there is only one peyote myth, although there are many variations on the single theme. Since the peyote tradition has moved outward from the very limited peyote-growing region, the myth has presumably been passed along with the dried plants and the ritual. The peyote myth tells how an Indian (or several Indians—number, age, sex and condition varying according to the particular version) is lost or wounded and left for dead in an uninhabited desert region. Starving, thirsty, at the end of his strength, he stumbles upon the peyote. A voice tells him to eat it. He eats it and feels his strength miraculously restored. His hunger and thirst are alleviated, and he is able to make his way back to his people, to whom he bears the word of a new god sent to heal their suffering. Usually the Indian hears a voice directing him to eat the plant, or sees a godlike form in the shape of an Indian brave standing where the plant stood; in some versions he is given instructions by Peyote himself on the proper performance of the peyote ritual. Peyote has been used to prolong the endurance of dancers, to alleviate pain, to produce visions, to give courage in warfare and generally as a means of healing and communion in the peyote cults.

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There are several points of almost equal importance in this brief summary. One is that the first man to eat peyote was very likely on the verge of starvation in that arid region where the plant grows. It is so unpalatable in appearance, so difficult to chew and swallow, that only a ravenously hungry man would be likely to make the effort. The lack of food plants in the peyote-growing area makes this hypothesis still more plausible. Furthermore, if a hungry man were to eat the fresh peyote he would almost certainly have a startling experience similar to the one described in the myth. His strength would be restored in an apparently miraculous manner and he would probably have hallucinations of some sort—visual or auditory or both. The peyote ritual, which presumably took shape gradually, was later attributed to the personified peyote, a god who was said to have revealed himself in a vision.

If the reader supposes that I am using the myth to shed light on the origins of the peyote cult, he is mistaken; I am using the *Lophophora williamsii* and all we know about it to shed light on the myth. It should be obvious at once that if we lift the myth from its cultural context, and substitute the word “cactus” or even “plant of life” for the word “peyote,” the tale might quickly find its way into collections of myths and folklore concerned with *imaginary* fruits, leaves, roots or stalks that are sought over the earth, guarded by dragons, used to inspire poets, to lend strength to the arm of the warrior or renew the youth of the immortal gods. Should we conclude, then, that the myth of peyote’s discovery is one variant on an almost universal theme attributable to the almost universal sameness of the unconscious mind? Or is it possible that the plants in the other myths are not necessarily imaginary? Are they, perhaps, real plants in imaginary gardens? Perhaps their mythical uses are derived from their cult use, and extended by hyperbole until the plant itself becomes mythical in the songs and retold tales.

The soma-drink of the Hindus was made from a real plant upon which the soma cult rested just as the Plains Indian or Tarahumara peyote cult rests upon the peyote plant. The soma plant, pounded, soaked, and wrung out of a strainer, provided a drink that was inebriating even without fermentation. The soma was deified as

the god Soma, who inspired seers and poets and fortified the warrior. The kava-drink of Polynesia was prepared in much the same way from the kava plant (*Piper mythysticum*, "intoxicating pepper") and was used as a ritual drink, as a libation poured to the gods, and as a trance-inducing beverage for the soothsayers. Both these plants have heavenly counterparts that provide a tipple for the gods. In other words, they have a mythology, and a much more extensive mythology than that of the peyote plant. The jimsonweed, prepared by maceration and mixed with water in a ceremonial bowl, was formerly used by some California Indians during initiations, when the novice was expected to see visions and gain shamanistic power. It, too, has its mythology. The sacred mushrooms of Oaxaca are taken raw, on an empty stomach, like the fresh peyote. When the shaman has swallowed the mushroom, the mushroom-deity takes possession of the shaman's body and speaks with the shaman's lips. The shaman does not say whether the sick child will live or die; the *mushroom says*. Some Indians say of sacred plants used by their shaman, that the soul of an ancestor has entered the plant; it is he who takes possession of the shaman and speaks through his mouth. The oracle at Delphi chewed laurel leaves for the same effect; in a state of inebriation induced by a small amount of cyanide in the laurel, she surrendered to the god (in this case Apollo), who used her as his instrument. His will was made known through her utterances delivered in trance and interpreted by the attendant priests. The laurel was, of course, sacred to Apollo.

Apollo, like the Norse god Woden and most shamans of whatever race or sect, was associated with healing as well as divination or prophecy. The same plant that brings visions or otherworld experiences may alleviate pain. Even if it does not, the herbalist who knows the medicinal uses of healing herbs has the best opportunity to possess the occult knowledge conferred by hallucinogenic shrubs and fungi. There are plants used to ease the pain of childbirth and myths of magic plants used for the same purpose. There is a Peruvian tale, very like the peyote myth cited above, telling how men first discovered the use of the cinchona bark from which quinine is made. If we begin our inquiry into the possible reality

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of the "magic" plants figuring in mythology with a compendium of real plants and their real uses in medicine, divination and religion, the list is immensely long and inevitably immensely tangled because medicine, divination and religion are tangled. Medicine enters this complex not because primitive medicine was limited to faith healing, but because the shrubs and herbs used in treatment were also used in religious ceremonies.

The most obvious thread for the ambitious theo-botanist to grasp would be the relation of drug plants and intoxicants to shamanism and its characteristic mythology of the disembodied soul. The greatest obstacle the student would encounter is a dearth of knowledge about the drugs used and their precise effects on the nervous system. We know enough about shaman mythology to make a beginning, and we have many eyewitness accounts of shaman performances; but all too often we are told simply that the shaman "takes something," without being told what he takes. This gap in the narrative can be explained in part by the shaman's reluctance to give away his secrets, and in part by the fact that early informants were inclined to regard the shaman's act as Satanism if they were Christians or sheer hocus-pocus if they were skeptics. The current anthropological tendency, so far as I can make out, is to study the shaman as a psychological or cultural phenomenon. Mircea Eliade in his book *Le Chamanisme* mentions the use of drug plants by many shamans, but seems to consider the drugs incidental to the tradition. The pattern, he implies, is already formed; the drug, when discovered, is adapted to the shaman's use. This assumption parallels that of the mythologists who put the desire for an afterlife and the belief in an imaginary nectar of immortality before the experience of actual plants and beverages used in the ceremonial communion with the gods or the ancestors. The food of occult knowledge, by the same token, is treated as fiction; and when the shaman drinks a mysterious beverage, it is assumed that he does so in pretence that it is the mythical draught. But isn't this putting Medea's chariot before her team of serpents?

When we consider the origin of the mythologies and cults related to drug plants, we should surely ask ourselves which, after all, was more likely to happen first: the spontaneously generated

idea of an afterlife in which the disembodied soul, liberated from the restrictions of time and space, experiences eternal bliss, or the accidental discovery of hallucinogenic plants that give a sense of euphoria, dislocate the center of consciousness, and distort time and space, making them balloon outward in greatly expanded vistas? A belief in the soul's reincarnation would seem to me more plausible than the widespread idea of a soul's continued independent, disincarnate existence after it leaves the body, a concept usually explained by night-dreaming or an irrational fear of the dead. Perhaps the old theories are right, but we have to remember that the drug plants were there, waiting to give men a new idea based on a new experience. The experience might have had, I should think, an almost explosive effect on the largely dormant minds of men, causing them to think of things they had never thought of before. This, if you like, is direct revelation.

Trance, self-induced by whatever means, is an inseparable part of shamanism. During the trance the shaman's body is said to be emptied of his soul. There are two traditional interpretations of this phenomenon: one is the replacement of the shaman's soul by another spirit, that of a god, ancestor or deceased shaman. (The deceased shaman may of course be both god and ancestor, and any of the three may take animal form.) In the other interpretation, the one I am concerned with here, the liberated soul of the shaman goes on a journey, perhaps in search of a lost soul, perhaps as escort for the soul of one who has just died, conducting it to the land of the dead. The dislocated or liberated soul may fly across the pampa on a spirit-horse or ascend into the sky, to the moon or the North Star. R. G. Wasson, describing the effect of the divine mushroom taken in a séance at Huautla, says: "There is no better way to describe the sensation than to say that it was as though my very soul had been scooped out of my body and translated to a point floating in space, leaving behind the husk of clay, my body." This is the shaman's journey.

The effect of peyote or hallucinogenic mushrooms taken ceremonially to the accompaniment of drums, songs or the hypnotic chant of the shaman demanding the descent of the spirit is naturally somewhat different from that produced in a laboratory or

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office while a doctor sits beside his subject with a notebook. Nevertheless, Aldous Huxley's testimony on the effect of mescaline, especially insofar as time is concerned, is eloquent: "I could, of course, have looked at my watch," he says, "but my watch, I knew, was in another universe. My actual experience had been, was still, of an indefinite duration or alternatively of a perpetual present made up of one continually changing apocalypse." The mushrooms of Huautla do not contain mescaline, but the effect, according to Mr. Wasson, is similar: "The mushrooms sharpen, if anything, the sense of memory, while they utterly destroy the sense of time. On the night that we have described we lived through eons. When it seemed to us that a sequence of visions had lasted for years, our watches would tell us that only seconds had passed." The Indians say of the mushrooms: "*Le llevan ahí donde Dios está*"—"They carry you there where God is."

When the soma is poured on straw, the souls of the ancestors gather in their thousands to drink it, because this is their food. When the kava is poured in libation or drunk by the priests, the souls of the dead are invoked, and the entry of the shaman into trance announces their arrival. Ceremonially speaking, these are foods of disembodied spirits, but the Chinese have, in the Taoist tradition, another variant of the food of immortality. Here the emphasis is not on shamanism or the consultation of oracles, but on mysticism combined with alchemy. The Taoists, in their search for an actual "food of immortality," experimented with drug plants and venoms. They knew the uses of laurel, Indian hemp and muscarine extracted from the glands of the poisonous toad. They knew the *ling-chih*, the "divine fungus" eaten by Taoist hermits and depicted by Taoist painters. In one of his poems, Li Po announces that he has swallowed the pellet of immortality "and before the lute's third playing"—that is, the third stanza of a song—"have achieved my element." Does anyone suppose that Li Po really believed that a pellet would make him immortal? Was his pellet simply imaginary? Or was he speaking of the euphoria conferred by one of the drug plants known to the Taoist priests? To me it seems clear that his pellet was as real as a pellet of peyote paste; it was to him a "food of life" in the same sense that our

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aqua vitae is a "water of life." I also suspect that at least half the other foods of life (apples, ambrosia, leaves, bark, roots and elixirs) had their beginnings in real plants. The "talking" grasses and trees that the shaman uses to bring on his trance are certainly real, and insofar as they are used by him for this purpose, they are foods of knowledge—that is, of occult knowledge. Looking at the matter coldly, unintoxicated and unentranced, I am willing to prophesy that fifty theo-botanists working for fifty years would make the current theories concerning the origins of much mythology and theology as out-of-date as pre-Copernican astronomy. I am the more willing to prophesy, since I am, alas, so unlikely to be proved wrong.



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Utilization of Papaver¹

JAMES A. DUKE²

The well-known opium poppy (Papaver somniferum L.) furnishes opiates, ornamentals, poppyseed, poppyseed oil, poppycake, poppy flour, poppy straw and potherbs. Poppies also furnish analgesics, anodynes, ant food, antibiotics, anti-malarials, aphrodisiacs, baby rattles, bird food, copper indicators, cough remedies, demulcents, diaphoretics, diarrhea cures, febrifuges, fuel, fumitories, goiter treatments, hemostatics, hypnotics, imbedding media, indicators of the geographic origin of opium, molybdenum indicators, polyploidy inducers, salad vegetables, sedatives, sudorifics, tranquilizers and vesicants.

INTRODUCTION

An ethnobotanic or economic study of Papaver should focus on opium. Popov (1970) notes that although all members of the Papaveraceae are more or less poisonous, *Papaver somniferum* L. is most useful. Hoehne (1939) notes that no other medicinal or poisonous plant deserves more attention.

HISTORICAL SKETCH

The opium poppy plant, well known in ancient Greece for its hypnotic qualities, was first regarded as a magic or poisonous plant used in religious rites, only later to be used in healing. The divinities Hypnos (Sleep), Nyx (Night) and Thanatos (Death) were portrayed with poppies. More than 350 years BC, Hippocrates mentioned poppy juice as cathartic, hypnotic, narcotic and styptic. By the 2nd Century AD, Galen states "opium is the strongest of the drugs which numb the senses and induce a deadening sleep; its effects are produced when it is soaked in boiling water, taken up on a flock of wool and used as a suppository; at the same time, some can be spread over the forehead and in the nostrils." Pliny the Elder mentioned that tablets made from the

nutritious seed were taken in milk as a hypnotic; that opium mixed with roseoil was used for headaches and for eyedrops; that mixed with woman's milk, it was applied to arthritics (as were the leaves); and that mixed with vinegar, it cured wounds and erysipelas. Several writers suggest that the gall added to the vinegar for Christ on the Cross was a poppy capsule to alleviate His final suffering.

UTILIZATION

But for its narcotic properties, poppy might produce a variety of useful foods. Poppy seed are ground for porridge or used as a filling or glaze for cakes and pastries. They are rich in oil, carbohydrates, calcium, and proteins and have almost all essential amino acids except tryptophan (Bhown, Shah and Nath, 1965). The Council of Scientific and Industrial Research (CSIR, 1966) reports on seed analyses of five Indian poppy accessions: moisture, 4.3-5.2; protein, 22.3-24.4; ether extract, 46.5-49.1; N-free extract, 11.7-14.3; crude fibre, 4.8-5.8; ash, 5.6-6.0; calcium, 1.03-1.45; phosphorus, 0.79-0.89%; iron, 8.5-11.1 mg/100 g; thiamine, 740-1,181; riboflavin, 765-1,203; and nicotinic acid, 800-1,280 µg/100 g; carotene is absent. Minor minerals in the seeds include: iodine, 6 µg/kg; manganese, 29 mg/kg; copper, 22.9 mg/kg; magnesium, 15.6 g/kg; sodium, 0.3 g/kg; potassium, 5.25

¹ Paper presented at the 13th Annual Meeting of the Society for Economic Botany at the University of Mississippi.

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TABLE I
SEED OIL AND PROTEIN CONTENT OF *PAPAVER* ACCESSIONS AS OF
JANUARY 1, 1973

Species	Gm/1000 Seeds	Protein % N \times 6.25	Oil %
<i>Papaver clavatum</i>	0.1	25.4	34.9
<i>Papaver dubium</i>	0.1	20.6	39.1
<i>Papaver fugax</i>	0.1	21.4	47.7
<i>Papaver hybridum</i>	0.1	27.2	34.6
<i>Papaver hybridum</i>	0.08	24.8	42.4
<i>Papaver monanthum</i>	0.2	25.5	47.7
<i>Papaver orientale</i>	0.2	22.9	45.4
<i>Papaver orientale</i>	0.4	24.4	46.7
<i>Papaver pavoninum</i>	0.1	27.5	44.0
<i>Papaver rhoeas</i>	0.2	27.3	40.1
<i>Papaver rhoeas</i>	0.1	21.7	42.3
<i>Papaver rhoeas</i>	0.2	26.9	45.1
<i>Papaver somniferum</i>	0.4	25.0	43.0
<i>Papaver somniferum</i>	0.4	21.8	47.6
<i>Papaver tauricola</i>	0.2	22.5	43.8

g/kg; and zinc, 130 mg/kg; the seeds also contain: lecithin, 2.80%; oxalic acid, 1.62%; pentosans, 3.0-3.6%; traces of narcotine and an amorphous alkaloid; and the enzymes diastase, emulsin, lipase and nuclease.

Rather similar oil and protein contents are reported from several poppy species besides the opium poppy. From the U.S. Department of Agriculture, A.S. Barclay provided data from the Department's seed-screening program to January, 1973 (Table I).

Schaaf (U.S. Patent 2,437,561) lists poppyseed oil among oils that have Vitamin F effects in skin treatments. Iodized poppyseed oil has helped curb goiter in Latin America (Kevany et al., 1969). Christensen (1954) proposed poppyseed oil as a low-refraction embedding medium for the microscopic study of pollen exines. Poppyseed oil has been important in manufacturing paints and varnishes (Balbi, 1960). Poppyseed oil cakes were estimated to have 88 feed units per 100 kg, 27.5% digestible crude protein and 25.6% digestible true protein (Jarl, 1946). Fed to cows and horses, 1.5 kg of oil cake per animal per day produced no ill effects, but reduced the fat content of milk and

gave the butter fat a somewhat weak consistency (Edin, Holloday and Nordfeldt, 1941). Bunker and Fissner (1941), finding no narcotic effects of poppyseed cake, reported little difference in milk and fat production. A feeding experiment in which 100 g of cake was given with 600 g of hay to sheep revealed the following digestion coefficients: organic matter, 54%; crude protein, 87%; crude fat, 100%; crude fiber, 0%; and N-free extract, 48%. Digestible nutrients contained in the feed were: organic matter, 44.1%; crude protein, 31.6%; true protein, 30.6%; crude fat, 1.8%; N-free extract, 10.8%; and ballast, 30.7%. Lezy (1946) reports that *Papaver setigerum* DC. straw caused cerebrospinal excitation in cattle. Lagneau and Gallard (1946) discuss the symptoms and treatment of such cattle.

Poppies serve for birdseeds. Birds are often pests in poppy fields. Marikovskii (1970) notes that poppyseed are the favorite food of ants raised in a formicarium.

Are poppy seeds poisonous? Tabor (1970) published a recipe that Langham wrote in 1579: "Powder of white Poppie seede given to children in milke or possite drinke, or an alebrew, or rather with a

Caudell of Almonds and hempe seede, causeth them to sleepe." Hemp and white poppyseed may have been part of a poison used by Lady Macbeth to drug Duncan's grooms. On the other hand, Popov (1970) says, "The seeds, particularly of the white varieties, contain no morphine."

Used in beverages in India, poppyseed could be addictive because of the presence of free serine. Fairbairn and El-Masry (1968) show that pepsin digestion of ground poppy seeds can result in codeine production. Although the seed coats contain no alkaloids, narceine, narcotine, papaverine and thebaine are detectable in the endosperm and embryo (Michels-Nyomarkay, 1970). Sarkany et al. (1967) found narceine, narcotine and thebaine in the endosperm. After a patient experienced beneficial sedative effects from ingestion of about 4 teaspoonfuls of poppy seed, Preininger, Vrublovsky and Stastny (1965) found codeine, morphine, narcotine, papaverine, rheadine and thebaine, but in amounts too small to explain the sedative effects. Acid hydrolysis frees the bound alkaloids in the seed (Fairbairn and El-Masry, 1968). Since infants fed on poppy milk show poor nitrogen retention, Niermann and Winter (1931) concluded it was unfit for infants.

In Scandinavia, poppies yield 580 kilos crude fat/ha and 300 kilos crude protein/ha (Nordestgard, 1960). Similar fields could also produce 2 kilos morphine/ha from poppy straw. It is reported that vernalization at relatively high temperatures increases essential oils, alkaloids and fats (Ohasi, 1962).

Seeds survive 16 months with no viability loss at 37% relative humidity and a corresponding seed moisture percentage of 5.6 (Sijbring, 1963). Vapor heating impairs the germinative capacity (Fujita et al., 1967).

For centuries opium has served as a tranquilizer. At first it served mainly for hysteria and hypochondria, then for mania, and more recently for melancholia. In the 19th Century, many doctors considered it the greatest pharmaceutical (Carlson and Simpson, 1963), but then morphinomania became recognized as a psychiatric disease.

Marihuana and hashish (Tennant et al., 1971) may be adulterated with opium, morphine or codeine. This is one way in which marihuana could be a gateway to opiates. Other ways include: (1) In South-east Asia, opium-smoking hill tribes often grow marihuana as a hedgerow and add the leaves to their soups. (2) In India, one beverage combines marihuana seed, wine, poppyseed and opium. (3) In India, 80% of the people are attended by tribal doctors who use both marihuana and opium in their medicine kits. (4) Where both marihuana and opiates are illegal, they are likely to occur in the same illicit channels, so that users of one would associate with users of the other. The utilization of marihuana can conceivably lead to the utilization of opium.

Anand (1971) revives the old suspicion that an alcoholic extract of oat can be used in treating opiomania. *Cannabis* and *Scutellaria* (Day, 1872), *Argemone* (Dalziel, 1937), *Mitragyna* (Tyler, 1966), *Combretum*, *Blumea* and *Piscidia* (Lewin, 1964) have also been suggested as cures for morphinism. Yet in the past, the medical profession has advocated the use of opium as a treatment for chronic alcoholism and introduced heroin as a weapon against morphine addiction (Lennard, Epstein and Rosenthal, 1972). Juice of the leaves and stems of *Musa* are reported to be antidotal for opium overdoses. Substantial biochemical evidence indicates that addiction to ethanol is very similar to, if not identical with, addiction to opiates. Hwang (1970) notes a close correlation between opium and cholelithiasis. Disorders of the human tongue (Lyons, 1969) and the lung (Mazaud et al., 1963) are associated with opium smoking.

Dried capsules have been used for coughs in Europe, coeliac hypertension in ancient Greece, and diarrhea and coughs in China (Namba, 1965). The ripe capsule can be extracted with water and evaporated to obtain a product resembling opium (Fulton, 1944). Ancient Greeks used such tinctures for medicine or narcotics and the use of poppy "tea" continued long in folk medicine. Blyth and Blyth (1906, not seen; quoted by Fulton, 1944)

state that "the ignorant use of poppy tea has frequently caused the death of young children." A capsule the size of a small hen's egg may contain an average dose of morphine (Fulton, 1944).

In Peking, opium was in vogue as an aphrodisiac by 1550, but it probably was not adapted as an article of commerce for smoking until 1666. Macgowan (1859) concluded that poppy was not indigenous to China, otherwise the plant — its beauty lauded by poets, its flour described as lubricating the mouth, demulcent in the throat, harmonizing the lungs and nourishing the stomach — would have been faithfully recorded in the Chinese literature.

Near Canton, a citrus fruit, perforated for the addition of opium and then plugged, was carried in a rag for the perfume it exhaled. Gently warming caused the opium to diffuse through the fruit pulp. When needed, slices were shaved off for infusions to treat abdominal swellings, flatulence and diarrhea (Macgowan, 1859). Poppy flour mixed with glutinous rice or wheat flour is said to make good hot cakes, to which "bamboo drippings" may be added. Poppy leaves are used as salad. The "spring greens" are a good potherb; the stalks serve for fuel; "its roots enrich the soil"; ground seeds yield a nutritious meal and oil; the capsules are healing; and the leaves are extensively used to adulterate the poor man's tobacco. Even residual ashes of the smoked extract have some narcotic properties.

Southeast Asian Yao tribesmen that I observed have a most diverse intercropping. Among crops identified in poppy fields above a 28-family village north of Van Vieng, Laos, were amaranth, balsam pear, banana, (and related species), bean, betel, cabbage, chayote, Chinese radish, corn, cucumber, dill, eggplant, fennel, ginger, guava, kale, lemongrass, mint, mustard, onion, papaya, pea, pineapple, radish, string bean and possibly yardlong string bean, sugarcane, sweet potato, taro and yam bean.

Poppy seeds are broadcast periodically in November and December, the staggered seeding providing a staggered harvest.

Beginning in December, on the first day ripe pods are slit vertically on one side; on the second day the latex that exudes is scraped off near dawn; and on the third day the other side of the pod is lanced. Later the opium is mixed with water and boiled in a bronze pail, strained, boiled again until thick and kneaded. Seeds from the largest pods are retained for the next year's crop. Poisoned rice is placed near the seed to discourage rodents.

Meo tribesmen near Chiangmai, Thailand, planted opium in corn stubble with an occasional taro, a fruit tree or a pleasantly aromatic hedgerow of *Canna-bis*. Opium is smoked and marihuana boiled in soups. The Meo and Yao I visited did not use poppy seed or seedlings for food. Westermeyer (1971), studying the Meo of Laos, found opium in every home; many smoke it, and few become addicted. At the volition of the individual, opium may be used as a medicine, for pleasure or (rarely) to commit suicide. "Even the habitual once-a-day smoker appears no more impaired physically or socially than the cocktail-before-supper suburbanite (Westermeyer, 1971)." Among the Lisu of Southeast Asia, seeds and young leaves are eaten, capsules are used for baby rattles and opium is smoked or eaten for malaria and applied externally for headaches (Dessaint, 1972).

Young plants are sometimes eaten like lettuce (reported also to serve as an opiate) and are grown as a potherb in Iran. Petals and sometimes leaves are used for packing opium. Leaves have been rubbed on the body as an anodyne (CSIR, 1966).

Indian legends associate opium and marihuana with the *Shaivite* and *Shaktey* cults. *Sadhus* and *yogis* of these cults use either or both to induce concentration. Arabian medicine was brought to India around the 9th Century AD by Muslims and became known as *Unani Tibbi*. *Unani* formulations containing opium are used for catarrh, conjunctivitis, dysentery, haemicrania and as an aphrodisiac. *Ayurvedic* formulations containing opium are used for diarrhea, insomnia and aphrodisia.

Ayurvedi describes the following properties of poppy: opium is aphrodisiac,

poppy seeds enhance capacity for muscular performance and promote the body luster, and the capsules cause impotency and dryness of the body. The capsules are said to cause nervous excitement, intoxication, garrulity, food reserve utilization and constipation. Seeds are considered tonic and aphrodisiac and are believed to allay nervous excitement and cause phlegm production. Opium is considered tonic, cleansing, binding and antiphlegmatic and is believed to cause biliousness, nervous excitement, dryness and mental confusion. The Unani Tibbi seems more factual, describing opium's action as analgesic, anodyne, constipative, febrifugal, hemostatic, hypnotic and retentive. Because 80% of the population is attended by Ayurvedi and Unani, it is difficult to recommend elimination of opium and marihuana without making available other less addictive alternatives.

In an article on addiction to post, a beverage made by crushing unlanced capsules in water, Chopra et al. (1930) mention an Indian beverage (*charbughra*) consisting of a mixture of wine, hemp, opium and poppy capsules. It is often "chased" by tea with sugar or powdered ginger or cardamoms, which could enhance the effects.

In Okinawa, opium is used to treat whooping cough, madness, spermatorrhea, diarrhea and fever; a decoction of the stem is used for stomachache and diarrhea (Tawada, 1951).

Decorative poppy stems should be cut as the calyces crack and the cut ends slightly scorched and placed in water. Not only the flowers are ornamental; capsules have been imported for decorative purposes. Gilded or painted, they were used for funereal and Christmas decorations (Fulton, 1944).

Kapustinskii (1950) reports that extracts of poppy flowers are active against human microorganisms such as *Micrococcus luteus* and *Myobacterium* and against plant pathogens of the *Peronosporaceae*.

Karp (1946) concluded that some *P. somniferum* is genetically determined to have no opium. Fulton (1944) hoped for development of an alkaloid-free variety for edible seed production. Miczulski

(1967) showed that in intraspecific hybrids, morphine content was intermediate or higher, whereas seed yields were 21 to 71% higher.

ALKALOIDS

Henry (1949) notes that some alkaloids depress, whereas others excite the central nervous system. Ascending from morphine to papaverine, codeine, narcotine and thebaine, the narcotic action diminishes and power of reflex stimulation increases until, with thebaine, the effect is a strychnine-like convulsion. Opium may contain 3 to 23% morphine, 0.1 to 2% papaverine, 0.1 to 4% codeine, 1 to 11% narcotine and 0.1 to 4% thebaine.

Morphine is a powerful analgesic, narcotic and stimulant. It depresses thalamus, sensory cortex, respiratory and cough centers; it stimulates the spinal cord, vagus and vomiting centers and the third nerve center; and it increases tone of involuntary muscles, especially in alimentary sphincters. It reduces secretions except for the skin glands. It induces euphoria (within 1/2 hour after hypodermic injection) with muscular relaxation, lessened physical activity, dimness of vision, loss of pain and hunger, slowing of respiration and contraction of pupils. Larger doses (15-20 mg) induce sleep and may cause nausea, delirium and convulsions. Still larger doses cause depression, unconsciousness, or even death. According to Malheiro-Garde (1950), morphine concentrations of 0.1%, 0.2% and 0.5% induce polyploidy and fragmentation in *Luzula purpurea* chromosomes. Morphine has been reported in *Papaver bracteatum*, *P. dubium* L., *P. hybridum* L., *P. rhoeas*, *P. setigerum*, *P. somniferum* and dubiously in *Argemone* and *Eschsholtzia*, but few if any of the reports are documented with voucher specimens. Villada (1893) reports studies confirming minute traces of morphine in *Argemone grandiflora*, *A. mexicana*, *A. ochroleuca*, but such observations have not been reconfirmed recently.

Kleinschmidt (1960) showed that labeled tyrosine was converted to both morphine and codeine in poppy. In

mature leaves, demethylation of codeine to morphine is uniform, there being no equilibrium between methylation and demethylation. Rapoport et al. (1960) discuss the interrelationships between thebaine, codeine and morphine. By root-feeding groups of opium poppy plants with labeled morphine, codeine and thebaine, Stermitz and Rapoport (1961) showed that thebaine was converted to codeine and codeine to morphine with ortho-demethylation as a metabolic pathway. Kirby (1967) confirmed the following biochemical sequence: tyrosine→salutaridinol-1→thebaine→codeine→morphine. Isolated latex can convert tyrosine to morphine. Kleinschmidt and Mothes (1958) report cultivating about 400 varieties of morphine-rich strains of poppy. During unfavorable years with high rainfall and low sunshine, straw of 80% of the varieties showed a maximum of only 0.2% morphine, but during good years straw of 40% of the varieties showed 0.2-0.3%, and straw in a few varieties consistently showed 0.4%. Of the 96 best varieties cultivated, only 1% showed up to 0.8-1% morphine. Andreev (1963) doubled yields of morphine via polyploidy. Triploids were especially rich in morphine. Opium samples inoculated with *Aspergillus* and incubated for a month lost morphine significantly, when compared with controls after 2 years (Pruner and Accadia, 1961). On the other hand, inoculating poppy broth with *Alternaria* increased the extractable morphine and codeine (Anon., 1968). Poppies can be ensiled or dried for the production of morphine and secondary alkaloids (narcotine, papaverine and thebaine). When suspended and dried at room temperature, 20% of the morphine is lost. When dried like hay in the field, 30% is lost. Siloing for 5 months is satisfactory (Roemisch, 1961). Of fertilizer taken up by poppy, 51.8% of N and 64.3% of P₂O₅ appeared in the seed, whereas K and Ca appeared mostly in straw (Schroeder, 1966).

In its report for 1966, the United Nations for the first time distinguished between morphine manufactured from poppy straw and morphine manufactured from poppy straw concentrate. In 1966,

25.7 tons of morphine were manufactured from straw, 10.8 tons from poppy straw concentrate and 112.9 tons from opium. Poppy straw concentrate was manufactured in Argentina, Netherlands and Poland and used for morphine in Argentina, Australia, Belgium, Netherlands, Portugal, South Africa, Spain, Switzerland and the United Kingdom. The concentrate was exported by the Netherlands and Poland to Belgium, South Africa and Switzerland. Poppy straw was used for morphine in Argentina, Bulgaria, Czechoslovakia, East Germany, France, Hungary, Norway, Poland, Romania, USSR, the United Kingdom and Yugoslavia. Principal exporters of poppy straw were Australia, Belgium, France, Switzerland, Turkey and USSR. Principal importers were Belgium, Bulgaria, Czechoslovakia, France, Hungary, Italy, the Netherlands, Norway, Switzerland, the United Kingdom and West Germany. Although morphine from opium is said to be twice as expensive as that from capsules (Shuljgin, 1969), the percentage of morphine made from opium (as opposed to that from straw and concentrate) steadily increased from 63.5% in 1962 to 75.5% in 1966 [Bull. Narcotics 20(2): 50, 1968].

From the aqueous extract of 2,000 kg dry straw, from which the alkaloids were removed, Schmid and Karrer (1945) isolated p-hydroxybenzaldehyde, benzoic acid, fumaric acid, 2-hydroxycinchonic acid, phthalic acid, hemipinic acid, m-hemipinic acid, p-hydroxycinnamic acid, p-hydroxystyrol, meconine and 5 other substances. Papaverine, codeine, narcotine, narcotoline, and thebaine can be obtained from "coalkaloid-benzene," a side product of the Kabay process (Bognar et al., 1969).

Rasmussen and Ilver (1945) report 2.5 tons straw/ha, or 2.5 kg anhydrous morphine/ha. In Russia, the morphine content of capsules varied from 0.4 to 0.9% with a dry morphine content approximating 2 kg/ha. Although there are reports of higher or lower morphine content, Bencze and Halmy (1948) found 0.459% morphine in the capsules of blue-seeded strains, 0.440% in gray-seeded and 0.458% in white-seeded.

Papaverine, with little narcotic or analgesic action, relaxes the involuntary muscles (intestinal, biliary, bronchial tree, urether, blood vessels). It slows the heart less than morphine or codeine. Intravenous injection increases cerebral blood flow but affects respiration little. It has been reported in *P. commutatum* Fisch. and Mey, *P. setigerum* and *P. somniferum*.

Codeine is less narcotic, constipating and euphoric than morphine. It stimulates the spinal cord and lower part of the brain less than morphine and depresses higher cerebral centers less. There is less sedation on respiratory centers than with morphine. Small doses are soporific, whereas large doses cause restlessness and increase reflex excitability. According to Ramathan (1966), nearly 85% of the world's 120 tons of licit opium in 1960 was converted to codeine. Codeine is reported in *P. bracteatum* and *P. somniferum* and dubiously in *Argemone* and *Eschscholzia*.

Narcotine, the most abundant alkaloid after morphine, is a very mild narcotic and spinal stimulant. Falling between thebaine and codeine for convulsant activity, it accelerates respiration and has a colchicine-like action on mitosis. It has been reported from *P. rhoeas*, *P. setigerum* and *P. somniferum*.

Thebaine is convulsant rather than narcotic. Some of its pharmacological activities are discussed by Ishikawa (1927). In dogs, it acts as an anti-emetic. In large doses it may cause tetanic spasms (like strychnine) or may paralyze the peripheral motor nerves. Currently thebaine is an important source of narcotic antagonists sought to curb heroin addiction as antabuse curbs alcoholism.

In a cross between *P. somniferum* and *P. orientale*, the total alkaloid level, as well as codeine and thebaine, was higher in the F_2 than in the F_1 (Lorincz and Tetenyi, 1966). There are high- and low-thebaine strains in both *P. somniferum* and *P. orientale* sensu latu. Crossing high-thebaine *P. somniferum* with *P. orientale* to improve the morphine yield increased the morphine yield 2.2 times in the capsules and about 30 times in the root, with insignificant increases in the amount of thebaine (Böhm, 1966) (Chem. Abstr. 68:

47094c. 1968). Gross and Dawson (1963) showed how Tyrosine- C^{14} supplied to *P. orientale* seedlings was incorporated into thebaine, oripavine and isothebaine. Thebaine was much more abundant than other secondary alkaloids in seedlings, suggesting that it is an intermediate in morphine-alkaloid metabolism in *P. bracteatum* (Pfeifer and Heydenreich, 1961). Spectrophotometric evidence suggested a shift from isothebaine to thebaine and oripavine production by the seedlings. In *P. somniferum*, thebaine content is variable in different organs in different stages. Decapitated plants accumulate more thebaine than normal plants, suggesting that the transformation of thebaine to codeine and morphine is inhibited by decapitation. Etiolated seedlings have a highly increased thebaine content (Neubauer, 1964). Mass production of seedlings *in vitro* could yield much thebaine. Thebaine has been reported in *P. argemone* L., *P. bracteatum*, *P. intermedium* DC., *P. orientale*, *P. oreophilum* Rupr., *P. pseudo-orientale* (Fedde) Medv., *P. rhoeas*, *P. setigerum*, *P. somniferum* and *P. strigosum* (Boenn.) Schur, but few if any of the reports are documented by voucher specimens.

OTHER POPPIES

Papaver aculeatum Thunb.

Watt (1967) notes that toxicity tests have proved negative and doubts that this species has any morphine-like narcotic properties.

Papaver alpinum L.

Seeds of the ornamental Alpine Poppy have been found in mammoth stomachs (Ridley, 1930).

Papaver argemone L.

An infusion or a syrup of petals of the Sand Poppy is used in Spain as a sudorific (CSIR, 1952-66). Capsules are sometimes a nuisance in wool (Ridley, 1930). This poppy is sometimes grown as an ornamental in Europe.

Papaver bracteatum Lindl.

Cullen (1968) states that most cultivated "oriental poppies" are the great

Scarlet Poppy, *P. bracteatum* (unique in that 98% of the total alkaloid is thebaine). In the second year, 30 kg thebaine/ha can be produced (Neubauer and Mothes, 1963). Latex from the pods contain up to 26% (dry weight) thebaine but no morphine (Sharghi and Lalezari, 1967). Böhm (1970) describes research to produce a thebaine-rich strain of *P. bracteatum*. If thebaine can be converted to codeine as cheaply as morphine can be converted and if *P. bracteatum* straw yielded 30 kg thebaine per ha on a sustainable basis (cf. 2 kg/ha morphine from poppy straw), *Papaver bracteatum* may be an attractive starting material for codeine and narcotic antagonists. The seeds, small and pleasantly flavored, like those of oriental poppy, are consumed in Iran. Because this species can be crossed with opium poppy, a hybrid strain could possibly be developed with good oil-seed qualities, high thebaine and no morphine.

Papaver dubium L.

In Australia, this annual is suspected to cause dermatitis and salivation in cattle. Elsewhere the petals are used as sudorific and the plant is used in homoeopathy. Aporeine is reported to be a tetanizing poison resembling thebaine in its action. It produces a burning and numbing sensation on the tongue (CSIR, 1966). Kazaryan and Della-Rossa (1967) hint that floral anomalies of this species indicate copper and molybdenum in the soil. The seeds, which weigh only 0.0208 grains, have been found in the crops of wood pigeons (Ridley, 1930). Schwerdfeger (1936) dispelled the belief that may beetles [*Melolontha hippocastani* (F.) and *M. Melolontha* L.] can be controlled by sowing *P. dubium*, *P. rhoeas* or *P. somniferum*. Occasionally *P. dubium* is grown as an ornamental, but in India it is considered a winter weed.

Papaver floribundum Desf.

This biennial is occasionally cultivated as an ornamental.

Papaver fugax Poir.

Kazaryan and Della-Rossa (1967) note that floral anomalies of this species indicate copper and molybdenum in the soil.

Papaver glaucum Boiss. and Haussk.

The annual Tulip Poppy is a popular ornamental with many of the alkaloids and the aroma of opium.

Papaver hybridum L.

The bristly capsules sometimes get entangled in wool. In Iraq, this is a weed in irrigated barley fields. Its juice is used to raise blisters (United States National Herbarium Collection).

Papaver lacerum Popov

Because the petals are sometimes completely black, this species is sometimes cultivated, perhaps more bizarre than ornamental.

Papaver nudicaule L.

Seeds of the Arctic perennial Iceland Poppy are used as a painkiller and tranquilizer by the Kalmucks, where opium poppy and other species are not available (Uphof, 1968). Flowers and capsules are mildly diaphoretic. The plant is said to poison sheep (CSIR, 1966). Seeds and pods are consumed by grouse (Ridley, 1930). At one time, this was an important cut flower in England (Anon., 1920).

Papaver orientale L.

Fulton (1944) reports that the small seeds of the perennial Oriental Poppy are probably as tasty as those of *P. somniferum*. Tournefort said that the Turks were accustomed to eat the green heads, though they are very bitter and acrid (Coats, 1968). Schroeder (1962) discusses its propagation as an ornamental. Thebaine is reported to be the predominant alkaloid during active growth, but at maturity the plant contains mostly isothebaine, which stimulates and later depresses the central nervous system (CSIR, 1966). Kazaryan and Della-Rossa (1967) report that floral anomalies in this species indicate copper and molybdenum in the soil. Pruner (1961) admixed latex of this

species with opium in attempts to determine the opium's origin.

Papaver pavoninum Fisch. and Mey.

The annual Peacock Poppy is sometimes cultivated as an ornamental.

Papaver pilosum Sibth. et Sm.

Olympic Poppy is a common ornamental, closely related to the oriental poppy.

Papaver rhoeas L.

Flowers of the Field Poppy are used as an expectorant and the petals for coloring wine (Uphof, 1968). The pollen, with unsaturated fatty acids constituting 91% of the total, is intensively sought by bees in Italy (Battaglini and Bosi, 1968).

Considered an autumn weed in Europe, Field Poppies can be controlled by dusting with 170 kg Ca/ha (Sunderlin and Gustafsson, 1946) (Biological Abstract 20886, 1946). Dried flowers of this well-known ornamental, avoided by cattle, contain rhoeadine and a little morphine (Popov, 1970). The mucilaginous petals are used for cough or hoarseness; they are also anodyne, sedative and sudorific. An infusion of the petals has been used like litmus, turning red with acid, blue with alkali. Bruised leaves are considered diaphoretic and are used for colds (Viguier, 1814). Hakim, Mijovic and Walker (1961) state that eating the seeds might cause glaucoma. McNaughton and Harper (1964), blaming the toxicity on morphine and rhoeadine, report cattle and horse poisoning. In India, latex from the capsule is considered narcotic and sedative, like that of opium poppy in Europe (Puri, 1971). Seeds that weigh only 0.02135 grains each have been found in the crops of wood pigeons. They yield 22% of a non-toxic oil that resembles poppyseed oil (Awe, 1937). The Shirley Poppy, emblem of the American Legion, is a derivative of field poppy and has been important in the cut-flower trade.

Papaver setigerum DC.

Occasionally grown as an ornamental, this close relative of opium poppy contains some opium alkaloids. It has been implicated in cattle poisoning (Lezy, 1946).

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Man and Cannabis in Africa: A Study of Diffusion

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The past decade has seen an awakening of research interests regarding psychoactive and hallucinogenic drugs. While the New World is particularly rich in these natural products, no drug has as wide a distribution nor as universal an appeal as cannabis. This hallucinogen is known by different local referents but the most widely distributed is marijuana in the United States and Latin America, and hemp or Indian hemp in many of the other Anglophone areas of the world. While it has near universal distribution, it is nonetheless to the Old World we must look for its origin and original acceptance.

Cannabis was originally cultivated as a fiber plant and only its leaves were used in the pharmacopoeia of different peoples. Linnaeus classified it as a simple species Cannabis sativa, but "recent research indicates that there may well be several species."¹ At this stage we are not concerned with this botanical question but intend to focus on the social use and diffusion of the plant through Africa.

In this paper we will examine in turn the historical, sociological, and linguistic evidence relating to the cannabis plant in Africa. Then, after a brief review of current hypotheses regarding the diffusion of cannabis, we will propose a more encompassing hypothesis to account for its spread in sub-Saharan Africa.

HISTORICAL EVIDENCE

The early trading contacts between India and the Arabian Peninsula, as well as trade and settlement by Indian and Arabian merchants started around the Horn, but soon extended southward along the east African coast. Early trade links between Arabia and the east African coast are well documented and were flourishing by the first centuries A.D. Doubtless such trading involved valued products from India, Turkey, and Persia in exchange for minerals, precious stones, and ivory. According to classical sources an Arabian trade center existed at Rhapta and in time settlers and traders spread southward, along the coast.

Neville Chittick reports that by the eleventh or twelfth century Muslim settlements could be found on Zanzibar and Pemba, and also at Kilwa.² The same author suggested that "By the early tenth century A.D. (al-Mas'udi), there were Muslims in Qanbalu (Pemba?) and there were already Bantu settled in this zone. By the mid-twelfth century (al-Idrisi), most the inhabitants of Zanzibar were Muslim; there were numbers of towns on the mainland, most of which appear to have been pagan,"³ and there was close contact between these settlers and Bantu speakers. This is also the period during which cannabis spread westward from India and Persia to Egypt.⁴

Ahmad Khalifa, referring to Arabic historians, stated that cannabis was introduced into Egypt during the reign of the Ayyubid dynasty, around the mid-twelfth century; "as a result of the emigration of mystic devotees from Syria."⁵ We might then suggest that the Arab communities on the African east coast were associated with cannabis, either in the form of the domesticated variety used for its fiber, or the wild variety which was used as medication and as a mind-altering substance.

Much of the trade with the interior regions of Africa was by ascent through river valleys but these frequently were rendered impassible during the rainy season, thus necessitating extended periods of stay in the interior. A. McMartin⁶ in fact suggests that at various inland centers the Arabs had semi-permanent settlements where they would spend one or two years away from the coast. When the Portuguese made their way up the Zambezi in 1531 to establish a trading post, a small Arab community existed at Sena, almost a hundred miles from the coast.⁷ Based on ethno-historical sources, D. P. Abraham has estimated that at the start of the sixteenth century at least ten thousand Arabs were in Rhodesia tapping the wealth of the Zimbabwe settlers in Rhodesia.⁸ In time they had a great influence over the Karanga territory--an influence they later exchanged with the Portuguese who traded from their new base in Mozambique. Two centuries later David Livingstone commented on the presence of Arab traders and Arab influences in wide areas of central Africa.

We need not overemphasize the presence of the Arab traders in the interior. At the time when the first Arab settlements were being established off the east African coast, and the gold trade with Sofala was being regularized,⁹ there were already Bantu-speaking peoples in contact with them. These Bantu-speakers were gradually spreading southward as they expanded their territory or grazed their cattle. As far back as the second and third centuries A.D. imports were reaching central Africa via indigenous trade routes,¹⁰ or spreading further westward along an extensive series of trade routes into the Congo basin¹¹ or, more likely, conveyed by Swahili-speaking traders into the Great Lakes region. In a discussion of excavations of sites on Lake Kisale in northern Katanga, Jacques Neguin postulates a date of the seventh to the ninth century A.D. for them and states that "the perforated cowrie shell found in Burial 54 probably comes from the East Coast."¹² This is one of many suggestions by research workers regarding trade contacts at an early date, but more important, trade contacts from east to west. Further south there is documentation of similar indigenous trade, for around 1835 "the Matabele had considerable traffic with the Amasili/Masarwa off the edge of the Kalahari, exchanging iron, daggo (sic), spears, hoes, and knives for ostrich eggshell beads, ivory, feathers, horns and skins."¹³

The same kind of trade into the Kalahari region from the peoples in South West Africa also existed, as did various trade links among the local populations who cultivated and used cannabis. H. Vedder (1928)^{13a} emphasized the value of cannabis as currency in transactions where, for example, the Bergdama who cultivated the herb, traded it to the Ovambo for goats and cows. In fact it was "the Bergdama's money with which they could buy everything they needed." In what later became South Africa we have earlier and better documented evidence of the presence of cannabis, though it was frequently confused with *Leonotis leonurus*.¹⁴ The inclusion of cannabis in the list of trade items between Khoikhoi

and Bantu-speakers on the east coast has been discussed elsewhere¹⁵ though it would seem that some groups among the Khoikhoi, particularly the *Hankunqua*, may have cultivated this herb. In addition to the Khoikhoi the San hunters both used¹⁶ and traded¹⁷ cannabis. In fact, when Whites settled at the southern tip of the African continent cannabis was in common use. We will return to this question when dealing with the linguistic argument below.

ARCHAEOLOGICAL DATA

That Iron Age Africans were cultivating in the Zambezi valley and raising their cattle in that region by the second or third century A.D. is now a well established fact. In fact, authoritatively dated archaeological sites from Zambia and Rhodesia show the presence of settled communities of Iron Age peoples between A.D. 185 and A.D. 300.¹⁸ These were village dwellers who were experimenting with iron smelting and pottery making. We also know that in Zambia trade items from the coast are quite common in archaeological sites dating from the sixth or seventh centuries.¹⁹ These sites are also rich in pottery and carved stone items, indicating that the bowls of pipes essential in the smoking of cannabis could have been readily prepared from either of these materials.

Further south smoking pipes were found in the Brandberg, South West Africa, where they were associated with large, open-station settlement sites attributed to the *Bergdama*. Two of these sites have radiocarbon dates of 1590 and 1730 A.D. respectively.²⁰ Apparently then people hereabouts were smoking by the sixteenth century. Based on ethnohistorical information we would suggest that they were in fact smoking cannabis.

If we look to the north of the general region just discussed, it is clear that cannabis was being used in the northern Kenya-southern Ethiopia region shortly after the thirteenth century date suggested for the introduction of cannabis into Africa. That it was being smoked is borne out by excavations in Ethiopia where two ceramic smoking-pipe bowls were excavated with a date determined to be 1320±80 A.D. More important however is the fact that both yielded positive tests for cannabis-derived compounds.²¹

ETHNOGRAPHIC EVIDENCE

A survey of seventeenth century and eighteenth century travel documents, ethnographies, and anthropological studies presents a picture of established cannabis users throughout sub-Saharan Africa.²² This applies not only to the Khoikhoi herders in the south and their San neighbors but also to the Bantu-speakers in contact with them. It applies equally to most of the Negroid peoples in south, east, and central Africa. This common cultural pattern of use and the terms used to refer to the herb (see below) suggests a longstanding acceptance of cannabis in most of sub-Saharan Africa.

There is by contrast a significant absence of cannabis among the traditional societies in West Africa. We do know that early north-south trade routes existed across the Sahara and that a degree of trade

existed centuries before Europeans made their contacts from the sea. This point must be emphasized because cannabis has always spread due to the contact of peoples and the trade route would thus be a normal mode of diffusion. We also know that cannabis was present in Egypt at about the same time that it was introduced to the African east coast. However, although the herb was used extensively in Egypt where it was grown in gardens and traded--ultimately as far west as Spain--during the fourteenth century, it failed to spread along the trade routes across the Sahara. This hiatus might be explained in terms of a desert climate which was not conducive to its growth or an unwillingness on the part of desert people and West African Negroes to accept it. It is also possible that it was not acceptable while in the form of dried leaves. We know, for example, that throughout this period cannabis, under the name "hashish" was eaten in Egypt and only much later used in pipes. Thus it might not have been accepted because it was not integrated with an established cultural pattern. Whatever the reason we have found no evidence of cannabis in West Africa before the Second World War.

It is possible, of course, that the West African peoples were simply not interested in the herb, that the population movements were east and south, thus discouraging much diffusion or elaborate trade routes westward, or that a combination of geographical barriers and ecological zones discouraged its spread. It is more than likely that a combination of these various factors was involved.

West Africa's isolation in this regard was breached when its people went eastward to war. As T. Asuni points out: "Cannabis sativa is not indigenous to Nigeria, and evidence indicated that it was introduced to the country and most likely to other parts of West Africa, during and after the second World War by soldiers returning from the Middle East and the Far East, and North Africa, and also by sailors."²³ There is furthermore no traditional name for it though a number of local referents have since emerged. Although by 1965 Nigeria was a supplier for local consumption, as well as for "illicit traffic between neighboring countries and in international illicit traffic,"²⁴ researchers have found the herb to be used primarily by "marginal" Africans; by young migrant workers; by "organized political thugs;" or by "recently evolved secret societies with criminal aims, such as Odozi Obodo and the Leopard-men society of Nigeria"²⁵ apparently used as a compensatory drug under stress. In contrast to some of the cases in East Africa where cannabis is well-accepted and used by males and females alike, in Nigeria we find that it is "almost entirely confined to the male sex."²⁶

Further west, in Ghana, the situation is almost identical to that in Nigeria. The first illegal cultivation of cannabis in Ghana was reported by police in 1960 where the herb is called "Wee," which is seen by one author as "a corruption of 'weed' by seamen."²⁷ It is smoked, but only in the form of a rolled cigarette. We can thus view it as a truly recent introduction without the normal accompanying paraphernalia of the waterpipe.

THE LINGUISTIC PICTURE

There are two important terms in the history of the herb: Sanskrit bhanga which resulted in the Hindi use of bhang; and Arabic kinnab, a word which probably accounted for the adoption by Linnaeus the botanist of the sub-order cannabis.

In its natural form in India, growing either wild or in a cultivated state, cannabis was referred to as bhang. This term applied to the dry leaves of the hemp plant which were used either for a tea or for smoking. It is also the word which spread with the herb itself. ²⁸

Early Muslim writings, from the thirteenth century onwards, refer to banj or hashish²⁹ but the former may in some cases have referred to henbane. Those early writers who criticized the use of the herb as a drug, however, did use banj for cannabis. Medieval Muslim society also recognized its use and distinguished it from all other medicinal herbs. The use of hashish, which could refer to grass as fodder, weeds, medicinal herbs and so forth was simply a nickname and could be an abbreviation of al-hashish al-muskir "the intoxicating hashish."

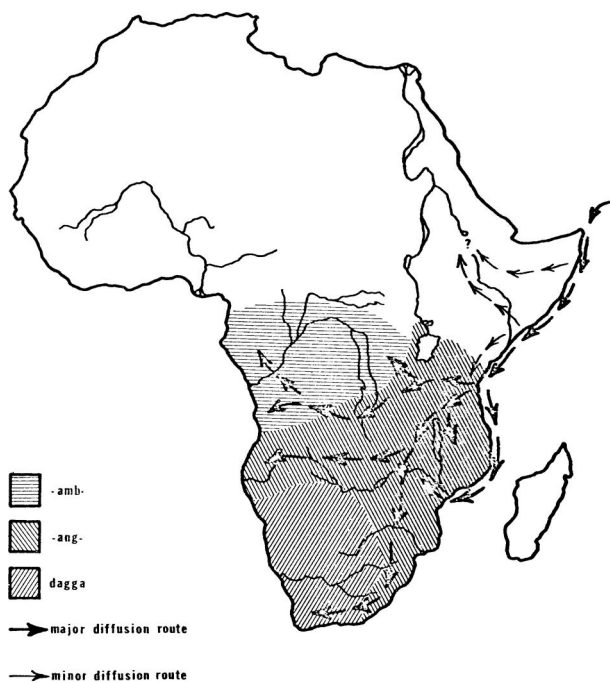
The early Arab traders introduced the term bang to Africa and in linguistic variant forms, it is found all over east and south Africa. Thus the Dictionnaire Swahili - Français prepared by the Institut d'Ethnologie (Paris, 1939) refers to Bangi, which indicates Indian hemp or hemp-like dried top sections prepared as intoxicants. The origins of the term are listed as: Hindi: bang, Arabic: banj, and Persian bandz (banj).

In the region of the East African Great Lakes, just south of Lake Victoria, cannabis is referred to as bhangi³⁰--no doubt the result of early Swahili contacts. When the explorer Speke during the 1850's made his way from the coast to the Great Lakes he found Arab communities and cannabis in use. The use of banghi was common as it still is among the Swahili along the coast.

Variations of bangi are, however, found further south. Thus the Thonga³¹ in the Zambezi valley refer to cannabis as mbange, while the Rhodesian Shona use mbanji. Just south of the Limpopo divide, southwest of the Thonga, the Venda who refer to it as mbanzhe, and the Sotho speakers called it lebake or patse. A slight phonemic variation occurs among the Swazi-Zulu speakers who use the term ntsangu and the Lamba in the present Zambia have long used uluwangula.³² Referring to a much more recent situation in Rwanda, Helen Codere³³ reports on cannabis use among the indigenous population. Cannabis, "called injaga in Kingarawanda," is associated with the Twa of both sexes and only very rarely with Hutu and Tutsi. The latter, however, use the herb medicinally.³⁴

We find then a geographical complex along the east coast and extending some hundreds of miles inland, or along the Zambezi, where indigenous Bantu speakers adopted not only the herb but also the term bang. The presence of Arab traders among them probably had some influence in this regard but the early dates for smoking pipes suggest that cannabis may have preceded its Arab bearers in the process of diffusion.

Bang and its Bantu derivatives are not found in all of southern Africa. In the southernmost part of the continent we encounter an historical accident which resulted in a common nomenclature which



clouds the geographical and historical importance of this single term. This is due in part to an erroneous application of the term and to generalization which followed.

The earliest use of the term "dagga" of which we are aware occurs in the diary of Jan van Riebeeck, the first governor of the new Dutch settlement at the Cape of Good Hope. The date was 1658, and it was spelled as "daccha." It is almost certain that here and in numerous subsequent references we are not dealing with Cannabis sativa but with Leonotis leonurus a well-known flowering shrub used by the Khoikhoi. Van Riebeeck refers to this daccha as "een droogh cruyt dat de Hottentots eeten ende droncken van worden" (a dry powder which the Hottentots eat and which makes them drunk). In discussing the medicinal and poisonous plants of southern Africa, J. M. Watt and M. G. Breyer-Brandwijk point out that Leonotis leonurus R. Br., also referred to as Rooi dagga, Wilde dagga, or Klipdagga was in early times smoked by the Khoikhoi instead of tobacco. They also quote early authors to the effect that the White Colonists employed the plant and that "the preparation produces narcotic effects if used incautiously,"³⁵ and that "Laidler records that in olden times the Namas formed the powdered leaf into cakes which were chewed evidently for the intoxicating effects."³⁶ Many of the same properties are ascribed to another member of the family, Leonotis leonotis R. Br., also referred to as Knoppies dagga or Klipdagga.

While it is impossible to confuse the adult plant of Cannabis sativa and adult specimens of the Leonotis group which bear clusters of bright red flowers, it is likely that the common use and related effects of these two plants lead to the similar term being applied to both plants. This classificatory error also underlies suggestions that Cannabis products were eaten or drunk in the Cape. As well as being eaten, the Leonotis leaves were also smoked, usually after being mixed with tobacco, so that a double confusion arose in contemporary writings.

One of the most complete linguistic analyses of the term "dagga" has been made by G. S. Nienaber in his study entitled "Hottentots" (1963).³⁷ In suggesting two possible origins for this term he refers to the works of a number of previous researchers: (a) Following Hahn and Lichtenstein, it is possible that Dutch term tabak (tobacco), which frequently appears as twak, was corrupted to twaga, later toaga and finally dagga. This however seems a farfetched origin. (b) A much more plausible postulate is that the Khoikhoi term daXa-b or baXa-b, which among other things refers to tobacco, is the root noun from which dagga could be derived. When referring specifically to dagga we find the qualifier !am - (green) being added to the root mentioned above, and the result is !amaXa-b namely "green tobacco" or dagga.

Lichtenstein, Meinhof, and Nienaber himself doubt that dagga is an original Khoikhoi word. Meinhof goes so far as to suggest that dagga is really a derivative of the Arabic word duXan (actually duXXan) or tobacco,"³⁸ which came in by way of the early Khoikhoi migrants.³⁹ We should immediately point out that no other language group in South Africa ever used such a term or anything resembling it.

Early European observers in South Africa normally had difficulty in recording phonetically the terms they heard among indigenous peoples. In time a variety of spellings for this common Khoikhoi word began to appear in the literature. Thus we find daccha (1658), dacha (1660),

dackae (1663), dagha (1686), daggha (1695), dagga (1708), tagga (1725), dacka (1775), and daga (1779), as writers recorded the practices associated with the plant.⁴⁰ We must repeat that not all these writers in fact were referring to *Cannabis sativa*. Furthermore, not all of them were speaking of smoking the herb to which they referred.

Since early white settlers were introduced to cannabis in southern Africa by way of the Khoikhoi herders, it was only natural that the term dagga became the common referent. Today it is the standard term in formal English and Afrikaans references, social, medical and legal.

We thus far have established two terminological complexes in Africa, namely, terms derived from the Hindi term bang, and the widely used but narrowly distributed term of dagga. There is, however, a third terminological complex which extends over a relatively wide region covering Angola and Zaire. Here we find the terms diamba, riamba, liamba, or chamba. When it was discovered that cannabis in Brazil was known by these terms it was thought that these words had perforce to be of Portuguese origin. It was furthermore argued that either the herb had reached the African south-west coast by the time slaves were taken to the new world or that the Portuguese were instrumental in the diffusion of the term--and possibly the plant.

One of the most interesting areas from which our analysis may begin is the Congo drainage area and its border districts. From ethnographic sources we know that cannabis was used in present day Zaire, where for example hemp-smoking was said to be "the curse of the Batetela in Kasai province."⁴¹ Harry Johnston summarized the situation by stating that "hemp as a narcotic is not much used in the Congo basin except in the southern, south-western, and south-central parts, and the western Mubangi. This practice has nearly died out in the Kingdom of Kongo, though it was prevalent once. Of late years hemp-smoking has developed in a rather sensational fashion among the excitable Bashilange..."⁴² The latter is a sub-group of the larger Luba people and occupy the area around the confluence of the Lulua and the Kasai. It would appear that Swahili traders from Zanzibar⁴³ introduced *Cannabis* into the region after the 1850's and the original "bhang" was here referred to as "riamba." During the civil strife in the early 1870's a secret society calling itself Bena-Riamba was formed. Early writers translated this as "Sons" of hemp, but Johnston pointed out that we should differentiate bena (meaning "brothers") from bana (meaning "children"). He suggested the use of an initial D- rather than R-⁴⁴ to read Bena-Diamba. Because the use of riamba is ubiquitous we will retain it in this discussion. In time there was concern about the increasing use of the herb in the Congo region and secret societies were formed to counter its use. A quarter of a century after Johnston's remarks H. Wissman pointed out that "among the younger generation it is already beginning to decrease."⁴⁵ It is interesting that among the Badjok, a southern Bantu people, who reside in the same region reported on by Johnston and Wissman a researcher met informants who "denied ever smoking hemp, but a great quantity of it grew near Mayila's hut--probably as an ornament."⁴⁶

Cannabis was also smoked in the northern part of Zaire⁴⁷ and had spread into the former French Congo. A. L. Cureau stated that people smoke tobacco moderately, but "the same cannot be said for Indian hemp, the habit of indulging in which is making frightful progress" (sic)⁴⁸ even using what was then recognized as a "peculiar pipe for smoking it."⁴⁹

Northeast of the area just discussed namely in the Great Lakes region, around Ujiji, Richard Burton discovered that almost every one, "even when on board the canoe, smokes bhang",⁵⁰ but it was not as common in the Lower Congo. Writing slightly later than Burton, Herbert Ward⁵¹ tells us that "wild hemp smoking (Liamba) is practiced by some of the natives...The practice however is not extensive, and it would appear to be a habit of comparatively recent origin." The picture which emerges is one in which cannabis was used widely but not necessarily by all ethnic-linguistic groups. We do, however, find a common term throughout the Congo drainage region. According to Jose Pedro Machado's Dicionario Etimologico da Lingua Portuguesa⁵² the words diamba and liamba are derivatives of the Kimbundu word riamba which refers to the cannabis plant. Also in Tchiluba the herb is referred to as diamba and, we are told, but need to confirm, that it is known in KiKongo as mfanga. We find the same noun-stem being used in the southern and eastern part of Angola among the Vangangella⁵³ and the Ovimbundu. The latter in fact refer to cannabis as epangue and it is cultivated and smoked exclusively by men.⁵⁴

We are thus left with the major terminological divisions of an -ang-complex derived from the term which was originally introduced and an -amb-complex said to be of Mbundu origin. It is significant though that neither J. Gossweiler and F. A. Mendonça in their highly regarded Carta Fitogeografica de Angola (1939)⁵⁵ nor Do Espirito Santo in Nomes Vernáculos de Algumas plantas da Guiné Portuguesa (1963)⁵⁶ refer to cannabis in these territories, either by botanical classification or by the more general term. We might suggest oversight on their part or failure to recognize the presence of the plant. (This would not be an out-of-the-way explanation, for in a volume entitled Harvest of Time - Angola of the Past the author, Jose Maria d'Eca de Queiros, uses a photograph of himself⁵⁷ smoking a cannabis water pipe apparently without being aware of the content since the caption reads: "After choking several times, the author at last learns to smoke the water pipe of the Quicos." The Angolan onlookers were obviously enjoying the experiment.) What we would suggest is that cannabis might be of fairly recent origin so that it is still seen as a foreign herb and not one of the "native" plants of Angola or Guinea.

CURRENT DIFFUSION HYPOTHESES

The literature contains a number of suggestions on the spread of cannabis into southern Africa:

- (1) J. M. Watt, a pharmacist, has suggested that: "the plant may have been introduced by the early travellers circumventing the Cape from the east."⁵⁸ Almost all our historical documentation and linguistic evidence suggests a date long before the fifteenth or sixteenth century return of European navigators.
- (2) Theodore James, basing his argument on a single case of terminological agreement (namely Hindi and Shangaan /Thonga/ - already mentioned) states that: "the plant was first carried to the coast of Mozambique...by the Portuguese militant traders returning from India."⁵⁹ This sets the date even later, and certainly does not recognize documents regarding early use.

(3) J. E. Morley and A. D. Bensusan, point out that the plant is not indigenous to Southern Africa. "It appears most likely that it was brought by Arab traders to the Mozambique coast from India. From there it was carried southwards by the migrating Hottentots and Bantu."⁶⁰ In general, this position is supported by A. J. H. Goodwin.⁶¹ While recognizing an earlier date of introduction of cannabis, this hypothesis is rather vague as to "Hottentots and Bantu."

(4) James Walton refers to his own survey of archaeological reports which refers to pipes found in early Bantu settlements, and also to Dos Santos' description of cannabis cultivation by the eastern Shona in the sixteenth century. He then suggests that cannabis "was introduced into southern Africa by the very first waves of Bantu invaders from the North."⁶² The use of the herb would then have spread from Bantu to Khoikhoi and San. Walton's suggestion certainly comes closest to the accumulated evidence being presented in this paper.

(5) There is one additional route we must keep in mind, although this has not been incorporated in any of the diffusion hypotheses: a spread from south Arabia through Ethiopia. It is well established that the Amhara people very early on came from Arabia, but a variety of products preceded and followed this Semitic invasion. Thus Simoons suggests that contacts between ancient Cushitic peoples and settlements north of the Red Sea were continued in later times when Amhara settlers continued these contacts.⁶³ In the process, plough agriculture, a zebu strain of cattle, and various agricultural products spread to Ethiopia. The question which arises is whether cannabis could have been one of these products. Recently N. J. van der Merwe reported on two ceramic pipe bowls excavated at Lalibela cave near Lake Tana. Both were parts of water-pipes and had been impregnated with definite cannabis-derived compounds. The author concluded that "some variety of Cannabis sativa was smoked around Lake Tana in the 13th-14th century, in much the same way as it is today."⁶⁴

The importance of the Lake Tana find and the associated radiocarbon dates are of great significance. They imply either that cannabis entered Ethiopia from southern Arabia, or that it spread from the east African coast in a northerly direction from Bantu-speaking to Cushitic peoples. One problem which arises is that Lake Tana is in the north central part of Ethiopia. Could we postulate a trade route from the present-day Kenya into northern Ethiopia? Unfortunately we have not yet come across a thorough study of early trade routes in northeast Africa and are thus not able to suggest diffusion from the Kenya coastal region to Lake Tana. Such diffusion may in fact have occurred prior to the east Africa settlement of the Arabs.

However, if we are dealing with a spread of cannabis from the north into Ethiopia, and Franz Rosenthal suggests that "the use of hashish spread through India, China and Ethiopia...",⁶⁵ there remains one critical issue involving the way it was used. Referring to the use of hashish in medieval Muslim society Rosenthal also notes emphatically that "in our sources, hashish is never described as having been smoked."⁶⁶ Since the estimated date for the Lake Tana excavation is no more than a century later than most of the other references used by Rosenthal we are dealing either with a very rapid change in method of use, or with an independent diffusion not typical of the other methods used around the region.

The available evidence then seems to allow for a possible diffusion of cannabis from Syria to Ethiopia. Diverse sources of evidence suggest Khoikhoi contact, for instance in the presence of pottery, cattle, and words. Merrick Posnansky points out that "evidence of a trickle of peoples from the Horn in the last millennium of the pre-Christian era and in the first of the post-Christian era is available from the Erythriote (or caucasoid) skeletal remains from the Horn, Kenya, Tanzania and Malawi."⁶⁷ The first contacts with Khoikhoi found them to possess "a form of zebu cow which probably accompanied them sometime in the first half of the present millenium if pottery parallels between East Africa and South Africa are any indication of a fold movement." We have already mentioned the Khoikhoi word for tobacco. If the argument outlined here is considered seriously it would imply that Khoikhoi had close contact with Ethiopia and then spread south along the east coast prior to the Bantu expansion. As the Bantu occupied the coastal region and migrated southward, they forced the Khoikhoi into a similar migration which finally brought them to the Cape.

An alternative explanation, of course, is that cannabis and the water pipe diffused from East Africa. This would certainly tie in with the rest of the data presented here. It also rests very heavily on a dispersal from the south into Ethiopia along trade routes described for a later period by Richard Pankhurst.⁶⁸

Just as likely an hypothesis is one which postulates the spread of cannabis from earlier Arab settlements or Indian trade centers around the Horn of Africa. Diffusion would then have been effected along the salt-trade routes discussed by Abir.⁶⁹ This would even allow for the spread of cannabis directly from India, since it is recognized that in the tenth century "Indian merchants were visiting Sokotra in vessels called baraja, and /that/ they were often in conflict with the Muslims."⁷⁰

If we were to accept the Horn of Africa as a diffusion center it would imply either that these Indian traders used the water pipe and introduced it along with cannabis, or that they learned about the water pipe from Arab traders during these excursions, or, finally, that the water pipe was independently invented near Lake Tana, a somewhat unlikely conclusion in the light of the subsequent diffusion of the water pipe.

Though he was not concerned in detail with the diffusion of cannabis, A. H. Dunhill, writing for the *Encyclopaedia Britannica*, apparently has his chronology and his migration routes backwards. He states:⁷¹ "The Bushmen and Hottentots of southern Africa used the dakka pipe; which cooled and mitigated the effects of hemp smoke by drawing it through a horn of water."⁷² While Africa continued to produce more orthodox pipes of almost every possible material and size the water pipe spread to India...and the Far East, and...was popular...in Persia in the 17th Century." Most scholars eg. Laufer⁷³ recognized the water-pipe as originating in Persia and spreading south and east from there. We should once again point to the significance of van der Merwe's statement (vide supra) that the two 13th century ceramic pipe bowls excavated in Ethiopia "formed part of waterpipes."⁷⁴

We are aware of course that the water pipe did not require the elaborate paraphernalia now associated with it. In Africa a wealth of forms appeared, as gourds, antelope horns, and other containers were adopted. In modern urban settings everything from milk bottles and soft

drink cans to coconut shells are used as water containers. In this respect it is of interest that the waterpipe which was integrated into Indian hemp smoking came to be called the Nargila, derived from Nargil, the word for a coconut, and based on Sanskrit nārikera meaning coconut.

CONCLUSION

In the light of all the evidence available to date, none of which is either conclusive or quite satisfactory, we should like to offer the following hypothesis regarding the diffusion routes of cannabis in major outline only in sub-Saharan Africa. We have, for reasons cited above, presumed that the Khoikhoi, who preceded the later Negroid migrants southward across the African plateau and along the east coast, were not the major bearers of cannabis.

During the first centuries A.D. Arab traders who had settled around the Horn and southwards from Mogadishu had introduced cannabis to the indigenous African population. It would appear that the herb was introduced as a product to smoke rather than in the form of hashish to be eaten as it was in Egypt. From these northern locations along the coastal settlements of what is today Somalia and Kenya, cannabis was carried and traded into the interior where its presence and use in northwestern Ethiopia have been documented.

At about the same time Bantu speakers were living not only on the east African plateau but also occupied "in force the humid coastal belt" as far north as the Juba.⁷⁵ This is just south of the city of Mogadishu in the general area of the earliest settlements referred to above. The Arab settlements during this period which are best documented, however, were further south on Pemba and Zanzibar, and also on the mainland as far south as Kilwa. From here Swahili (and Arab) traders introduced the herb to Bantu settlers. The latter were mostly Iron Age peoples who were expanding their population and incorporating new territory, including most of the drier inland areas of Kenya and Tanzania and no doubt northern Zambia and Katanga (Shaba). The herb needed no advocate. It is after all a "social" plant, basically associated with human settlements and given the warm climate of central Africa it was capable of spreading quite readily.

It would seem logical that with the early contact and trade by Africans from Angola cannabis might have reached the Kongo and Mbundu by the early part of the sixteenth century. This was a period of intensive interaction during which slaves were traded and political alliances formed. In his discussion of valued items traded by the Kongo, Mbundu, and Ndongo, David Birmingham⁷⁶ does not mention cannabis or anything related to it, but he does show the kind of networks which extended from the west coast to peoples in the interior. The Portuguese traders first moved up the Kwanza and contacted the Mbundu. They also traded slaves from the Kongo, and these two groups (the Mbundu and the Kongo) were in contact with the Lunda and the Luba further east. It was here, we would suggest, that cannabis was used in the form of mfanga and where the phonemic change occurred so that it was referred to as riamba. This was also the word accepted by the Portuguese and exported to Brazil with the slaves.

At the same time that cannabis was carried into the interior of Africa, Arab traders settled further south, and then moved up the Zambezi River in order to trade with the Rozwi Empire. Brian Fagan and D. W. Phillipson⁷⁷ refer to a pipe "with a male stem" which was unearthed at Sebanzi in Zambia. They date it as coming "from the level dated cir. A.D. 1200." In a personal communication Joseph Vogel, who is currently conducting research in the area, informs us that he tends to treat "the Sebanzi conclusions as interesting, worth investigating more fully, but necessarily tentative." It still leaves us, however, with an early date for the presence of a smoking pipe.⁷⁸

The Zimbabwe complex may offer more convincing evidence. Within an archaeological stratum which reached its climax about 1450 A.D., Summers found "some pipes for smoking dagga (Indian hemp)."⁷⁹ He neither indicates the depth of the particular find in terms of the level, nor whether the ash in the pipes was tested for cannabis derivatives. We are thus left with archaeological evidence of smoking pipes and cannabis in southern Africa no later than the middle of the 15th century, and possibly earlier.

The hypothesis regarding this diffusion would then allow for the spread of cannabis from Rhodesia southward or westward into and across the Kalahari. It would seem likely that the Bergdama by this date were already growing the herb which they had received from earlier Khoikhoi or from their neighbors to the north, the Ovambo and Ovimbundu, representing the furthest known spread westward of the linguistic stem -ang-. The Ovimbundu refer to epangue, a term very close to the Ovambo epangwe. The Bergdama speak of daXab suggesting that they obtained knowledge about the herb from Nama-speakers prior to contact with the Orambo.

While the herb was never of major economic significance throughout most of Africa it was recognized as having a strong traditional value and therefore formed part of the trade goods of many peoples. The hypothesis which has been presented in this paper pointed at a number of areas in which more information is needed. The linguistic picture is perhaps the most complete.⁸⁰ Much of the historical and archaeological evidence may have been clouded by acceptance of the argument that nothing was smoked before the Portuguese introduced tobacco. Currently I am involved in an extensive literature survey to trace all references to cannabis use. Such research is linking historical information with the modern situation. As its users migrated to urban areas, cannabis has gained in economic importance and finally its illegal status has placed an even greater monetary value on this ancient herb.

NOTES

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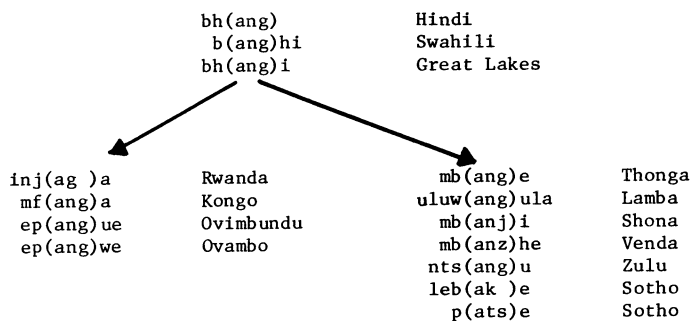
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- ³⁸Ibid, p. 243.
- ³⁹See also in this regard the discussion under diffusion hypothesis no. 5 below.
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Chat: Coffee's Rival from Harar, Ethiopia. I.

Botany, Cultivation and Use

AMARE GETAHUN AND A. D. KRIKORIAN¹

INTRODUCTION

Although the Qur'an, or sacred book of Islam, expressly forbids the drinking of wine (cf. Sūrah ii, 216; Sūrah v, 92 of the Qur'an)² the chewing of leaves and twigs of *Catha edulis* (Vahl) Forsk. ex Endl., variously called qāt, jāt, kāt, khat, gat, chat,³ Abyssinian, Arabian or Somali tea, etc., has served so well as a substitute that the plant has at times been referred to by Moslems as the "Flower of Paradise".

Since most accounts of chat are old (cf. Hartwich, 1911, pp. 470-474; Lewin, 1931, pp. 242-245), very brief (Claus et al., 1970, p. 289; Hoffer & Osmond, 1967, p. 47; Tyler, 1966), highly popularized (Moser, 1917; Fellows, 1967), relatively inaccessible (Hill, 1965), or necessarily exaggerate or underestimate its supposed addictive or narcotic qualities (Greenway, 1947; Peters, 1952), we should like to present a broad overview of the early history, botany and pharmacognosy, cultivation, economics and so-

ciology, chemistry and pharmacology of chat. Special emphasis will be given to chat as it is grown and used in the area of Harar (see Figs. 1a and 1b). Although the use of chat probably dates from man's earliest times, tradition says its use as a social stimulant originated in this part of Ethiopia.

EARLY HISTORY

The date of the introduction of chat as a crop into Ethiopia is not known, and since no adequate written record is available, the early history is neither clear nor certain. The folklore on chat is highly variable, and at times both coffee and chat share the same lore (cf. Wellman, 1961 pp. 6-10 and references there cited; El Mahi, 1962) and as with coffee, there is disagreement on the origin and spread of chat.

Much of the lore of chat is still handed down orally. According to one such story, chat originated in Yemen. Its use

¹ College of Agriculture, Haile Sellassie I University at Alemaya, P.O. Box 138 Dire Dawa, Ethiopia and Division of Biological Sciences, State University of New York at Stony Brook, N.Y. 11790, respectively.

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² Wine under the name of *khamr*, is generally taken to imply all things which "intoxicate". Nevertheless, Al-Jatālān, the commentators on these verses say, "Only that wine is forbidden which intoxicates the brain and affects the steadiness of the body" (cf. Hughes, 1885, p. 670). Chat even in the strictest sense, therefore, is permissible. In fact, Burton wrote: "It is held by the Ulema [Muslim theologians who are professionally occupied with the legal system] here [Harar] as in Arabia, 'Akl al-Salikin' or Food of the Pious, and literati remark that it has

the singular properties of enlivening the imagination, clearing the ideas, cheering the heart, diminishing sleep, and taking the place of food" (Burton, 1966, p. 197).

³ The plant is known by a great many names depending on the geographical area; the most common is the Arabic name *khat* with phonetic variants according to language. We shall use *chat* as it is spelled in English the way it is pronounced in most of Ethiopia. Tradition has it that the word chat derives from another Arabic word *kut* meaning sustenance or driving principle but this may be incorrect since El Mahi (1962) suggests that the Arabic word "kahwa" for coffee and "kafta" (the Arabic word for the leaves of chat) derive from the place name "Kafa" in Ethiopia where they flourished. It is beyond the scope of this paper to analyze this possibility.

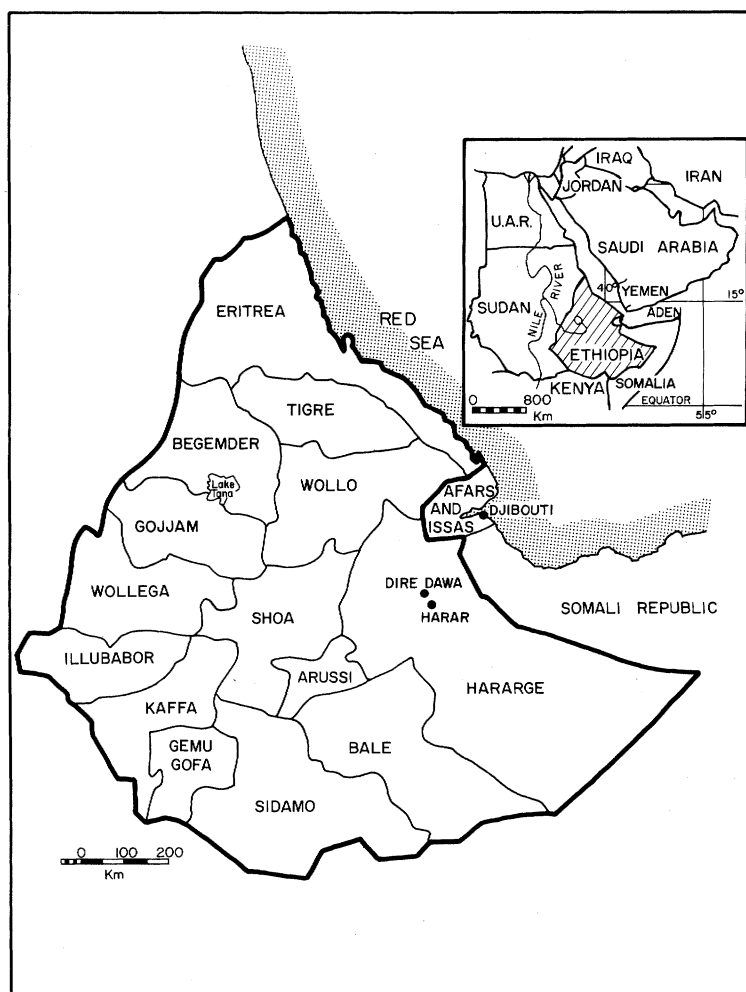


Fig. 1a. Map of Ethiopia showing its position in the eastern horn of Africa and general provincial outlines. The city of Harar and the town of Dire Dawa, important areas of chat consumption and commerce respectively, are also shown.

was discovered by a herder named Awzulkernayien, who noticed the effect of the leaves of the plant on his goats and tried them himself. He experienced wakefulness and added strength, and took some home and consumed a small amount before retiring for the night. He had no sleep that night and was able to stay up to pray and meditate for long hours.

Others believe that chat was first introduced into Harar City, from whence it spread to other parts of Ethiopia. The legend of the introduction of chat into Harar tells of a group of religious and civic leaders who met one day to deter-

mine a suitable site to establish a new city. They chose four sites. After long argument, a choice was made and Harar was built on the site of the present old walled city. The choice was made because of the suitable elevation, the splendid landscape and the many rivers and streams in the area, but it was soon discovered that the air of the new town had a depressing effect on the people and made them tired and very lazy.

The council met again to discuss this problem. They agreed that the holy tree of Awzulkernayien was the cure. A mission of merchants was dispatched to Yemen to fetch the chat, and thus the

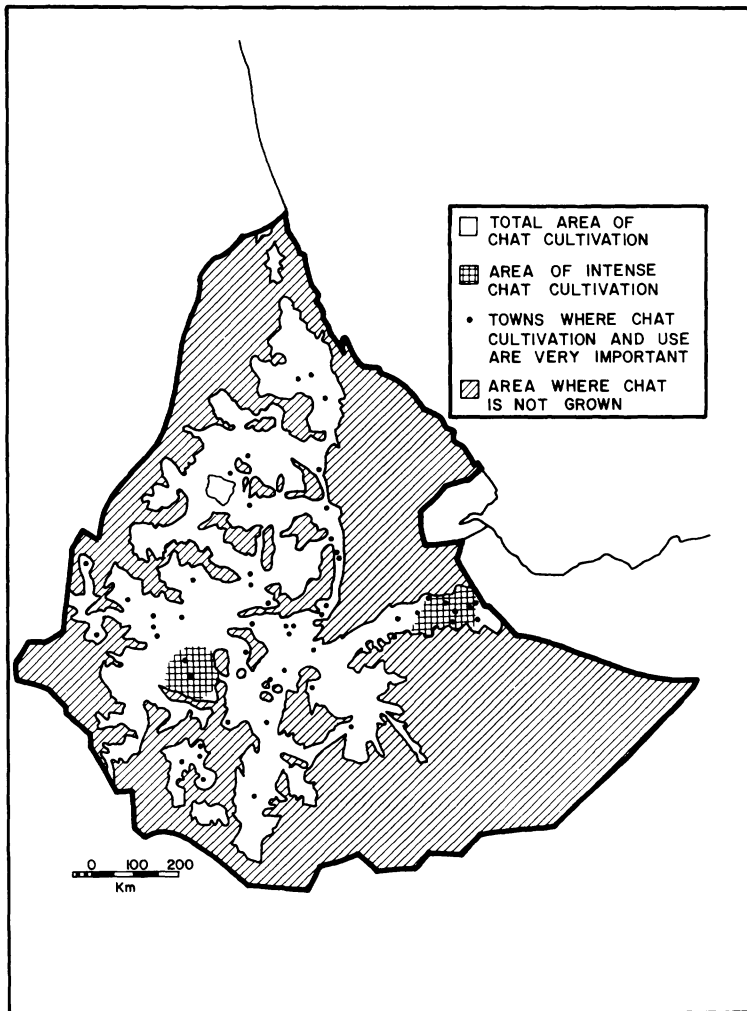


Fig. 1b. Map showing regions where chat is cultivated extensively. Consult key for details.

first chat is said to have come to Harar and indeed to Ethiopia. The first group of chat plants was allegedly planted in the area where the city of Harar now stands, but these original trees were dug out by the Italians in their efforts to landscape and expand the city in the early 1940's.

According to another tradition, espoused by Sir Richard Burton in his *First Footsteps in East Africa*, first published in 1856, Shaikh Ibrāhīm Abū Zaharbūi introduced chat into Yemen from Abyssinia. Ibrāhīm Abū Zaharbūi "was one of the forty-four Hadrami saints who landed at Berbera, sat in solemn conclave upon Auliya Kumbo or Holy Hill, and thence dispersed far and wide for the purpose of propagandism.

He travelled to Harar about 1430 A.D. (In the same year the Shaikh al-Shazili, buried under a dome in Mocha, introduced coffee into Arabia), converted many to Al-Islam, and left there an honored memory. His name is immortalized in Al-Yaman [Yemen] by the introduction of Kāt" (see Burton, 1966, p. 77). This account is purely legendary as Ibn Fadl Allah al-'Umārī, the historian, in his authoritative account *Masālik al-Abṣār*, written between 1342 and 1349 A.D., gives an account of its introduction into Yemen in the reign of Al-Mu'ayyad Dā'ūd, who personally found reasons for rejecting it. Al-'Umari also gives an account of its usage in Ifāt (cf. Al-'Umari as translated by Gaude-

froy-Demombynes, 1927, pp. 11-13.

There is also the legend of the two saints who often spent the entire night in prayer and frequently found themselves dozing or dropping off to sleep. They prayed to God to give them something to keep them awake. An angel appeared and showed them the chat plant, which would keep them awake.

Contrary to the popular oral traditions presented above, most writers believe chat to be of Ethiopian origin (cf. Huffnagel, 1961; Hagos, 1963). These views more than likely derive from the fact that chat is first mentioned in *The Wars of* [the Christian King] 'Āmda Syon I, who reigned A.D. 1314-1344 when the Muslim Sultan of Ifāt, Sabrad-Dīn, bragging of what he would do when he conquered the Christian Kingdom, said: "I will make Mar'ādē [the Arabic name for Tegeulat] his capital my capital also. And I will plant there plants of çāt because the Muslims love that plant, and (it is) a gift which he sent to the king." (cf. Huntingford, 1965, pp. 55-56; Perruchon, 1889, p. 331; Trimmingham, 1965, p. 228).

Chat is still considered holy and people offer prayer before they begin to chew it. A curious current conjecture is the mention of the name of Awzulker-nayien in this prayer, which could be taken as indirect evidence or testimony to the lore. A further bit of early evidence of chat being first considered holy was the method of its harvest and status of its use by the people. It is said that people washed their bodies before harvesting the crop; moreover, the harvested chat was put in clean cloth.

In the beginning, the spread of the crop was heavily and jealously guarded and severe penalty was imposed on anyone who gave a chat plant to Kotu⁴ or Galla farmers to grow. Thus for many years it was a highly sought-after crop and people walked for as much as seven days in an attempt to get the plant. Nevertheless, these searches were in vain and the final breakthrough in the spread

or release of the chat to the Gallas was only after the battle of Chellenko in 1887, a battle where many Adaris lost their lives fighting against Emperor Menelik II. Many did not return to their chat plantations, and their widowed wives, unable to tend the chat, took the Kotus as tenants. The Kotus thus had the chat in their hands, and many gave the chat to their relatives to grow; thence the spread of chat on a wide-spread basis began.

THE BOTANY OF CHAT

The following botanical account draws heavily on the writings of von Breitenbach (1963) and Verdcourt and Trump (1969). The chat tree usually grows up to 7 meters high; occasionally it reaches 15-20 meters. The bole is straight and slender; the bark is whitish and the crown is small. The leaves are opposite, ovate-lanceolate to elliptical, 5-10 cm long, 1-4 cm broad, obtusely acuminate, serrate, and the petiole is 0.5 cm long. Flowers are small, white, with 5 petals and 5 stamens in axillary cymes 1-8 cm long. The calyx is 5-lobed; the capsule is oblong, woody, pendulous, about 1 cm long with 3 valves.

The wood is pale golden-yellow to dark brown, lustrous, very straight-grained, of a fine, even texture, moderately hard and strong. When sawed and planed it gives a smooth finish and polishes highly without filling, and thus it is very suitable for cabinet work. Its air-dry weight is 42 lbs per cubic foot. *Catha edulis* (Vahl) Forsk. ex Endl. belongs to the family Celastraceae, a rather small family of about 38 genera with 400 species distributed in both hemispheres (Wang, 1936, 1939). In Ethiopia there are approximately seven genera and fifteen species.

Catha edulis in its natural state has wide ecological adaptation ranging from 5,000-8,000 ft or more in elevation. This is also the range under cultivation. Once established it seems to grow well under a wide range of soil types and climatic conditions (cf. Alles et al., 1961; Béguinot, 1969; Beitter, 1900, p. 16; Brooke, 1960; Chevalier, 1949).

⁴ A large ethnic group in Harar whose occupation is farming as opposed to the Adaris who are merchants and owners of chat plantations, and to Somalis who are nomads.

Beitter's doctoral dissertation (Beitter, 1900, 1901) pays considerable attention to the anatomy and pharmacognosy of chat leaves and twigs (cf. also Chevalier, 1911); moreover, the results of earlier studies (e.g., Collin, 1893, etc.) are all taken into account and are incorporated into what may legitimately be called the definitive account of the time. Until recently no new detailed work had been done (cf. Paris and Moysé, 1957, 1958; Shadan and Shellard, 1962; Elkiey et al., 1968). It is of interest that Beitter (1900 p. 67; 1901, p. 30) remarked upon the lack of latex or laticifers in chat samples obtained from plants grown in European botanical gardens and from Harar in contrast to samples obtained from Aden and suggested the influence of varying climate, soil conditions and cultivation methods on the plant's histology and composition. The alkaloids, he suggested, might also therefore vary under such influences. No further reference to this observation has been made in the literature as far as we are aware and no work has even confirmed the occurrence of laticifers, but it is of interest insofar as that latex vessels, when present, may be the site of alkaloid synthesis and/or accumulation. Tannin bearing cells, particularly near the lower epidermis of leaves, are prominent. The stem cortex and pith may also contain tanniferous cells. Presumably, these are the site of synthesis of the tannins which give chat its characteristic slightly astringent taste.

CHAT AS A CROP

Area of Cultivation

Wild chat is found in tropical eastern Africa and reportedly occurs in Gurage Country, Shoa, Ethiopia. It is cultivated in many places, such as the Arabian Peninsula, Ethiopia, Zambia and Somalia. In Ethiopia it is grown in several regions, namely Hararge, Gojaam, Wolega, Illubabor, Kaffa, Wollo and in parts of Eritrea and Arusi (Fig. 1a). Hararge, however, is the principal region of chat cultivation. The sub-provinces of extensive chat cultivation in Hararge are Harar, Woberra, Garamuletta, Dire Dawa and Chercher.

In Ethiopia, chat is grown for its fresh leaves and young tender twigs. Although the most common manner of deriving the effects of chat is the chewing of the fresh leaves and twigs, the use of decoctions or infusions (Greenway, 1947) and edible mixtures of honey or sugar with both dried and fresh chat have been reported (Peters, 1952). Greenway (1947) has noted that in Arabia, dried leaves may also be smoked. Moreover, other parts of the plant may be used, such as the wood for rafters, poles, spoons and combs, and also for fuel. In some parts of Africa the root is used as an influenza remedy, for stomach troubles, and for diseases of the chest.

There are many chat fields around the city of Harar, and there are extensive fields of chat in the Combolcha and Alemaya areas as well. The entire upper part of Dengego Mountain is devoted to growing chat. One may occasionally see a field of sorghum, but it is actually a permanent chat field, as the practice is to interplant an annual crop such as sorghum.

Chat culture seems to be gaining momentum in its spread, and in many areas where coffee was once grown, chat is now preferred since the net return per acre is greater than that from coffee. A study by Miller and Makonnen (1965) has shown that sorghum takes 33-53 per cent of the cultivated land and chat 13 per cent. In the use of family labor, 74 per cent of the time is spent on producing crops and raising livestock, and the remaining per cent is spent on social matters such as weddings, funerals, religious holidays and going to market. Chat accounts for 30-50 per cent of the total cash income per year per family, or 40-60 per cent of the total value of home-produced food used by the farm family, and is thus an important crop item wherever it is grown.

GENERAL CULTURAL INFORMATION

Soils and Topography

Natives believe that chat is adapted to a wide range of soil conditions, ranging from light, sandy to heavy, black. Water



Fig. 2. Hillside covered with cultivated chat shrubs. Note the terracing.

supply, however, seems to be more important than soil type, particularly in the early growing period.

The entire area of Alemaya, Combolcha, Harar and the eastern extremity of the Chercher Highlands is hilly, and erosion is severe, so chat is grown on the

hillsides, which are usually terraced (Fig. 2), while lower lands are devoted to sorghum, corn, vegetables and grazing. Granite is the prevailing parent material along with limestone and sandstone. The soils are red or reddish-brown, neutral to slightly acidic, and high in calcium and



Fig. 3. Upper portions of a "white" variant (called *ahde*) of chat.

low in nitrogen. A good response in plant growth is realized from fertilizer applications (Murphy, 1959). Nitrogen applications increase the vegetative growth of chat, and thus increase the yield.

Rainfall

Chat is grown in a wide range of rainfall patterns, and the rate of incidence of rain in one season is more important than the total annual rainfall. Chat can be grown in dry areas provided there is irrigation, but it does not toler-



Fig. 4. Upper portions of a "red" variant (called *dimma*) of chat. Note the blunt ends where the twigs have been harvested.

ate poor drainage and does not do well in wet soils.

Ecology

If one observes the areas where chat is extensively grown, it seems to thrive best in semi-highlands at 5,000-7,000 feet

(Wainadega Zone⁵); however, it also extends with irrigation down to the lowlands, 3,000-5,000 feet. Chat is also grown in highlands at 8,000 feet where it

⁵ A climatic zone, by native tradition, which is intermediate between the hot lowlands and the cool to cold highlands.



Fig. 5. Handful of choice tender leaves and twigs of a "red" variant of chat. Ordinarily leaves of such quality are not sold and are used only by the plantation owners.

is not too cold and if it is free from severe frost. It is generally planted on sloping or rolling hills where the drainage is good. It grows in shady areas or in partial or full sun.

Varieties

It is very doubtful whether there are real varietal differences in cultivated chat, at least in the Alemaya-Combolcha area. People distinguish chat grown here as "red" and "white" chat; on the market there are at least seven kinds of chat. These differences are related to cultural practices and to ecological differences (cf. Figs. 3, 4 and 5). The seven main market types of chat which are recognized by natives of the area fall under two major groups.

I. Kudda

- a. kerti — long, slender, young branches;
- b. kudda-kerti — after the first harvest;
- c. kudda — harvest after insect (kudda) damage;

II. Kudda Kerti

- d. urretta — short-branched;
- e. fahaka (or tacherro) — poor quality, usually comprising older, more leathery leaves;
- f. cheballa
- g. ferress-azem

The last four types are, as a rule, from irrigated fields. Hence, they are crops grown during the dry season.



Fig. 6. Flowering branch of chat. The tiny white flowers are borne from bases of the leaves.

There are distinct morphological types of chat recognized by the farmers. These include Dallota, which is predominantly white or light green; Dimma, which is red-leaved; Hamercot, which is intermediate between Dallota and Dimma, but more comparable to Dimma; Gohoba, which is much like Dimma but with

recognizable differences, and Mohedella, green to olive in color (Note: the above morphological types are represented in the Haile Selassie I University College of Agriculture Herbarium by voucher specimens).

Greenway (1947) provides other details of the kinds of chat from Aden and



Fig. 7. Branch of chat bearing fruit. The fruits are dry, about 0.35 inches long, splitting into three valves.

Ethiopia, and Peters (1952) does the same for Somaliland, Arabia and Ethiopia. The Report of the Qat Commission of Inquiry (1958, p. 6) gives the grades commonly used in Yemen. Discrepancies in spellings that one expected encounters in the literature are no doubt due to transcription (correct as well as incorrect) by non-native researchers of tribal dialects and inconsistencies in spelling phonetic variants. For instance, the listing given by Greenway (1947) (after Glover) for "Ethiopian and Somaliland sorts" are given in the Somali tongue although this is not indicated by the writer. The so-called "karthe" grade of Alles et al., 1961 (cf. Table I of our following paper), is presumably our "kerti." The spellings used by us repre-

sent the Galla or Harari pronunciation although the same designations may be used in other Ethiopian tribal designations.

"Red" chat reputedly has a stronger physiological effect than "yellow" or "white" chat (cf. Figs. 4 and 5). In general, the red variant is considered second in quality and fetches a lower price (as much as half), but this is artificial since the recovery of growth after a harvest is better and thus requires less care in the "reds". This is probably the reason for lower price rather than any innate qualitative differences. A detailed chemical study under controlled conditions would be necessary to settle this moot point.



Fig. 8. View of a chat plantation. In the foreground very young plants (bearing few leaves) may be seen intercropped with sweet potatoes. In the background are progressively older plants varying in size from shrubs to small trees.

Planting

Even though the plant flowers and bears fruit (cf. Figs. 6 and 7), the seeds are not used in propagation. Chat is vegetatively propagated from suckers or branches arising near the ground level. These root better than cuttings which are sometimes made from the branches.

The young plants are usually transplanted in midsummer (August) to permanent fields, although planting may be done any time during the year where irrigation is possible. Chat is planted in rows with half-meter to one-meter spacings; still wider spacings may be used to insure a better stand (Fig. 8). Twelve-inch stem cuttings or suckers are planted in holes made so that water can collect

and stand. One or two cuttings are put in each hole.

The ground preparation is very elaborate. During the first year, a good farmer will break the ground and do subsequent disking and harrowing. When the rains come, he ascertains that the ground is watered well. He allows the ground to rest into fallow, making sure that no weeds grow. Toward the approach of the next rainy season, he digs out the holes and is ready to set the plants when the rains come.

It is important to prevent grazing animals, particularly goats, from feeding on or molesting the new plants. The chat plant as it starts must be cultivated at



Fig. 9. Terraced chat plantation on a mountainside. Note the "tukul" or small hut on the left from which a farmer may guard his crop against night theft.

least once or twice yearly to conserve moisture during the height of the dry season and to increase ground percolation when the heavy rains come, as they seem to do in most of these chat-growing areas. The first harvest usually begins five to eight years after planting.

OTHER CULTURAL PRACTICES

Irrigation

Chat fields are irrigated in the dry season whenever water is available. Farmers in an area have irrigation schedules. Because of water scarcity and too many chat fields a farmer may not be able to get water more than once a month or in some cases only once in two months, or not at all. When irrigation is

not possible, and there is a prolonged drought, the farmer usually removes all leaves on the chat plant as a measure against excessive transpiration, thus inducing the chat to go dormant. If and when leaves are left on the chat plant, they gradually dry up and thus become host for spiders and insects.

Mulching and Manuring

Mulching and manuring as a means of reducing ground evaporation and the suppressing of weeds is not a general practice.

Intercropping

Sorghum, corn and sweet potatoes are generally intercropped with chat; this is possible as the chat trees are so spaced

TABLE I
SUMMARY OF HOURS OF LABOR USED IN DIFFERENT OPERATIONS ON CHAT
(From Miller, 1965)

<i>Production by Farmer on 0.29 Hectares: June 1, 1964 — May 31, 1965</i>			
Operation	Month	Hrs. Spent	Total Per Cent
Cultivating	All year	175	30.5
Guarding	Sept. — February	310	54.1
Harvesting	July	20	3.5
	February — March	40	7.0
Making Hut	August	8	1.4
Irrigating	January	20	3.5
TOTALS		573	100.0

that they leave much area between plants (cf. Fig. 8). The preparation of the seed bed for intercropping is in a sense a cultivation of the chat field, so the chat benefits.

Maturation and Harvest

It has been pointed out that the first harvest is made after five years. The greatest labor requirement is during these first years when it is necessary to establish a strong, vigorous and healthy chat that will live for many years with a maximum yield. Great care must be taken against climatic hazards as well as insect and domestic animal interference. Farmers here believe that the labor required to produce chat is much less than in the case of coffee, particularly if night-watching against theft is excluded (cf. Fig. 9).

There is some problem of harvesting in that it must be timed without respect to market trends. One cannot choose his harvesting time in order to get the best of market prices, nor can he store the harvested chat. It is towards the end of the rainy season (summer) that the maximum chat yield is realized by all farmers; other times are modified by cultural practices such as irrigation and defoliation. The farmers during this uniformly timed season of chat harvest have no alternative but to sell for whatever price the market has to offer, both domestically and abroad. When the price goes down, the local consumption increases. The excess produce, after the market has

been satisfied, is dried and ground into powder and sold to people making pilgrimages to Mecca. The powder is mixed with water into a paste for use by people too old to chew.

Chat is generally harvested in the early morning or late in the evening, particularly when it is to be exported. It is then carefully wrapped with shoots and leaves of *Rumex nervosus*. Banana, false banana [*Ensete ventricosum* (Welw.) Cheesman], or castor bean leaves are also used in wrapping chat. In a "Fahaka" harvest it is put in a shawl and sprinkled with water before taken to market.

Labor

Mention has been made of seed preparation, propagation and cultivation of chat. The daily labor required for chat is not high, but in research carried out by Miller (1965) it was found that 73 per cent of the family labor is on crop production and raising of livestock, of which 47 per cent is actually on crop production. The study further reveals that of this labor on crops, 35 per cent of it is on chat night-guarding, bringing the average total labor per acre of cropland to 548 hours (cf. also Tables I and II).

Yields

Compared to other crops grown in the same area, chat is a high-income crop, and once established the plantation lasts for more than one generation. Miller (1965) found in the same study that of

TABLE II
SUMMARY OF HOURS OF LABOR USED IN DIFFERENT OPERATIONS ON CHAT
(From Miller, 1965)

<i>Production by One Farmer on 0.55 Hectares: June 1, 1964 — May 31, 1965</i>			
Operation	Time Period	Hrs. Spent	% of Total
Cultivating	All year	363	31.8
Guarding	Sept. — February	589	51.5
Harvesting	February — March	40	3.5
	July	32	2.8
Making hut	August	12	1.0
Making irrigation ditch	January	75	6.6
Irrigating	January	32	2.8
TOTALS		1143	100.0

the total cash income/year/family, 30-50 per cent was from the sale of chat, and chat accounted for 40-60 per cent of the total value of home-produced foods used by the family.

Farmers, when asked what revenue they received from one chat tree, chuckled and replied, "At least \$10.00 (Ethiopian dollars) yearly," as compared to \$1.00 from coffee. If their estimate is correct, a farmer with a few chat trees in his annually intercropped field obtains good cash yearly.

As in other cultivated crops, there may be yield failures due to insect damage, disease or frost and hail storms which not only decrease crop yield but reduce quality, and this is reflected in reduced market prices. For instance, chat from a frost-damaged field will have leaves that are dull ash-colored and are said to cause headaches if chewed, hence may not fetch any money on the market.

Diseases and Pests

The presence of a tiny green leaf hopper, a beneficial insect, on chat is desirable. This insect, which inhabits the branches of the plant, causes the older tips to wilt and die off for the eventual emergence of new shoots. The exact effects of the insect on the plant or vice versa are not well defined nor has the insect been definitely identified as yet, but it is in the genus *Empoasca* (cf. Hill, 1965 p. 25 for a discussion of the insect pests of chat).

Chat in Harar is not greatly affected by diseases, but the following pathogens are recognized: species of the imperfect fungal genera *Oidium*, *Diplodia* and *Sep-toria*; the Ascomycete *Dielsiella pollacii*. Diseases and pests reduce production and affect the net return from the sale of the crop, but equally significant is their effect on the quality of the harvested crop. Since the method of chat harvest by hand is intimately tied in with the occurrence of disease and insect damage, price can be severely affected.

Marketing

The crop is highly perishable and no method has been perfected to effectively store it or process it into forms that keep longer. The chat must reach the consumer within two days. Since the export market of chat grown in the Harar area is mostly to Aden and Djibouti (see map), and because the communication and transportation facilities as they are now in this part of the world are poor, it is difficult to fully comprehend the problem of marketing (cf. also Brooke, 1960).

A few years ago there were ten to twelve merchants exporting chat from this area. Farmers thus had a large number of merchants to sell to and received fair prices as a result of competitive buying and selling. Since buyers went out to the farmers' fields to buy and did not wait for the product to come to the nearest market, this must have given an exaggerated impression and caused farm-



Fig. 10. View of part of the retail chat market at Dire Dawa. The only commodity sold here is chat.

ers to undertake more chat cultivation, thinking there was a high demand.

There is much grumbling and expression of dissatisfaction with the chat Export Monopoly, a government organization. Farmers complain they cannot join and have membership in it as they have no money, but at the same time seem to see a loss in their bargaining power where prices may be arbitrarily fixed without due consideration of the farmer. The volume of export has been reduced, farmers seem to think, without a corresponding increase in local consumption. This is borne out, in part, by the wide daily price fluctuation observed in the Alemaya market.⁶ For example,

⁶ A small town where most of the nearby farmers bring their chat; this is then transported by car to Dire Dawa where it is packed and air-freighted to Aden and Djibouti (see map).

the price of chat during the month of September, 1964, had up to 45 per cent fluctuation from morning to afternoon as chat from more distant areas reached the market. These farmers have no choice but to take any price, and to repeat the process each day.

SOCIAL IMPACT AND ECONOMIC SIGNIFICANCE

The magnitude of the social problem and its economic significance both at the community and national level have thus far been left for the reader to conjecture. There has been much talk on this subject at various levels and many groups of experts have been commissioned to study chat in order to recommend banning it or the continued use of it. Many



Fig. 11. Two Moslem chat saleswomen at Dire Dawa market object to being photographed. These women may be farmers' wives or may have purchased their chat at the wholesale market. The banana leaves are used to wrap the bundles of chat as they are sold.



Fig. 12. Typical scene at the Dire Dawa chat market. On the right, a salesman shakes a bundle of chat at the prospective buyer in an attempt to hawk his goods. The lad in the center is fingering a choice leaf.



Fig. 13. The level of activity at the Dire Dawa market is evident from the crowds and piles of chat.

TABLE III
ETHIOPIA: DETAILS OF CHAT PRODUCTION, 1954, 1957 AND 1961; ACRES
PLANTED, PRODUCTION PER ACRE, AND TOTAL PRODUCTION
(After Hagos, 1963)

Year	Acres in Production	Average Yield (metric tons)	Total Production (metric tons)
1954	7,410	0.48	3,557
1957	8,645	0.41	3,544
1961	17,290	0.41	7,009

have wanted to prohibit its use, but under this cloud of doubt, the use of chat, as expected, has spread.

The absolute truth of the ills and benefits of chat can never be assessed in full even by a government, let alone by individuals who have neither the means nor the understanding of behavioral complexities of people and economic phenomena. The remarks to follow will apply to the Harar area, but what is said of the socio-economic role of chat here is applicable to other areas and places where chat is also grown and used (cf. Fig. 1b).

Economic Significance

Chat is a high-cash income crop and is so important that in case of crop failure a farmer may find himself unable to pay his income tax, or it may take his entire remaining produce to meet the full payment. Considering the number of people involved in the production and marketing of chat and the economy involved, it has a more significant role than meets the eye. In an area where there are no industrial jobs available, agriculture must absorb all people, and chat seems to partly do this.

There are many people involved in the growing and harvesting of chat. There are the merchants involved in the buying, and there are those who provide the transportation. The transport of chat from its production area to the market involves beasts of burden (including men and women), four-wheel drive vehicles, buses and even airplanes. At each step there are people involved in the loading and unloading and packing and unpacking. There are still many more people in the actual market and marketing (cf. Figs. 10-13).

Whenever farmers realize economic improvement, they are quick to point out that it is due to chat. Thus chat is the bridge and highway whereby many a farmer moves from grass thatched to tin roof, from tenantry to landownership and perhaps to building a house in the nearest town and eventually owning an automobile.

Despite the uncertain market situation, it seems that chat culture is spreading at the expense of coffee and other agronomical crops such as sorghum and corn (Table III).

In 1962, chat accounted for 5.3 per cent of the country's total returns from exports (ranking fifth among commodity groups). Compared to coffee's 54.5 per cent for the same year, chat furnished a large per cent of domestic consumption as well.

Social Impact

At first, chat was used only by older men, and even then only in connection with religious rites. They chewed chat and drank coffee in order to stay awake and pray. Later its use was extended to non-religious activities such as attending the sick, weddings, or funerals, and business gatherings. Many age groups began to use chat. Moreover, in Harar, people believe that chat can effect 501 different kinds of cures which correspond to the numerical value of the letters of its Arabic name, Ga-a-t ($400 + 100 + 1$). Thus, the plant is regarded as an essential constituent in their daily life and plays a role in medicine, bringing about alleged "cures" (cf. Watt & Breyer-Brandwijk, 1962, pp. 178-182).

Chat is still mostly used by Moslems and is deeply imbedded in their socio-economic life. Nevertheless, it now cuts



Fig. 14. Roadside scene outside Alemaya. The gentleman at the left is preparing to smoke a cigarette. As so often occurs with drugs, the chat user may use other substances either in sequence or at the same time — especially coffee and tobacco and perhaps hashish.

through many faiths, social levels, and age groups, and in those areas where it is cultivated there seems to be always someone somewhere chewing it. Men and women on the farm and people in towns, whether they be civil servants or business men, are to be seen taking time to chew chat (see Fig. 14). The number of school boys chewing it is very high. There are varying degrees of chat use. Some casually chew while others may chew from dawn to dusk, with some chewing all night long. Many breakfast with chat, eat one light meal at noon and sit down again for chat chewing for the entire afternoon.

Peters (1952) has already described the manner in which leaves are chewed. "The leaves are removed from branches

and a large wad is placed in the mouth. If 'kuda' grade is being chewed, the whole branchlet is eaten. The wad is then chewed till all the juices are extracted; copious drafts of cold water are also taken at the same time, but no hot drinks or food. The leaves are chewed for periods of up to ten minutes and the residue is swallowed." Since a bundle of chat many weigh as much as 500 gm and some individuals are known to chew as many as five of these bundles per day, chat may represent a major portion of the daily food intake of heavy chat chewers (Nutrition Survey: Ethiopia, 1959; Darby et al., 1959). The amount of chat consumed also determines the pharmacological activity and must always be kept in mind when one consid-



Fig. 15. Farmer in the Alemaya area accommodates the authors in demonstrating his cheeks bulged with chat and his chlorophylled mouth. The tool he carries is a "kozerra" and is used to pull the high chat branches forward for harvesting. It is also used as a walking stick.

ers the effects of chat (cf. Galkin & Mironchev, 1962; Hodgkinson, 1962; Laurent, 1962a and b, 1963).

Chat cuts down on one's appetite. Inflammation of the mouth results after prolonged chewing, and a person is unable to eat even if he had an appetite. Moreover, the high quantity of tannins consumed adversely affects the stomach and causes gastric disturbances. We have pointed out that chat produces thirst, and thus liquid, usually water, is drunk. All of this leaves no room for other foods to be desired and thus health hazards may come when the indulger avoids other food. Nevertheless, a nutritional survey has revealed that chat has food value (Table IV).

TABLE IV
COMPOSITION OF CHAT
(per 100 gm of fresh leaves and tender stems)
From Darby et al. (1959), p. 169

Ash	1.6 gm
Protein ($N \times 6.25$)	5.2 gm
Fiber	2.7 gm
Ascorbic Acid	161.0 mg*
Thiamin	<0.05 mg
Niacin	14.8 mg
Riboflavin	<0.05 mg
Beta-carotene	1.8 mg*
Calcium	290.0 mg*
Iron	18.5 mg*

*Important amounts to user's diet.



Fig. 16. Scene in the village of Alemaya where chat chewers have just finished their early morning chewing. After the effects of chat are felt, the daily routine of activities may now begin.



Fig. 17. Scene in an Addis Ababa retail shop. Shoppers receive enormous loads of chat from wholesalers in places such as Dire Dawa and they sell it in bundles by weight to consumers. Note the strips of banana leaf on the counter which are used to wrap the chat.

Chat and Rural Society

The economic importance to the farmer has been pointed out, but his social life is very much governed by the same crop. Indeed, regular and continued use of chat by many a farmer is commonplace (Fig. 15). If we were to take a farmer and observe him through the course of the day with reference to his diet, we would find that at about 8:00 in the morning he takes *lafisso* (local unleavened bread) and *hoja* (an infusion made from crushed coffee leaf or hull with milk).⁷ He then goes out into the field and gathers some chat and sits down under a tree, and with a gourd or kettle of water with him he chews for two or three hours until he feels the stimulation of the chat. Towards noon or about 11:00 o'clock he starts to work in the field. The farmer sits for his second meal of the day at about 3:00 in the afternoon, and the third, later in the evening. He distinguishes two emotional periods in the use of chat:

1. The "*Harara*" is understood as being a period or time in the morning during which the farmer had not chewed chat and says he cannot think straight. Also, he feels frustrated and unhappy.

2. The "*Markana*" is the period when the farmer begins to smile and seems to forget all of his troubles, having chewed 1/4 to 3/4 kg of chat. He feels full of energy although he may appear to be irrational. All he sees is his work, and he may work for two to three hours continuously without any sign of fatigue.

Later, at about 3:00 P.M., he rests and eats his light meal with *hoja* and chews chat again. Then he resumes his work and labors until he is exhausted. It is during the *Markana* period that hard work is done. In fact, the farmers say that if chat chewing is not followed by hard work it will serve as an irritant rather than a stimulant. The women also

chew chat though not as much as the men. The diet of the women is much inferior to the men. Milk, meat and poultry products are generally reserved for the men (but are even then generally absent in the diet). Chat chewing in the house directly contributes to the poor sanitation that is prevalent in many homes. The discarded twigs and old leaves will form ground litter and are used as bedding material or floor cover (Fig. 16).

Chat in Urban Society

Whereas we find that chat is used in rural society to generate energy to do farm labor, in the towns and cities it is mainly a pastime habit (cf. Fig. 17). When asked about it, some answer, "We don't have anything else to do so we sit and chew chat". It is by this group that large amounts are consumed even though their entire daily earnings may not be enough to buy all the chat they consume.⁸ One often encounters bulged cheeks and chlorophylled mouths with passive facial expressions. Chat users generally smoke cigarettes while chewing.

Many Ethiopian educators note with some bewilderment the growing number of students chewing chat, although the students themselves think it helps them study. Again, many cannot afford the money. An experienced teacher can determine whether a student chews chat even though he has not actually seen him chew by noting the first signs of the habit. A student starts "to cut" many classes. This circumstantial evidence is reinforced by an inspection of a student's pockets, which often reveal the sugar which novices and beginners use to sweeten the chat.

Chat and Human Health

The effects consumers desire in chat are generally psychic in nature and are generated by central-nervous-system stimulation. Euphoria, increased alertness and general excitement and hyperactivity are commonly experienced. In

⁷Siegenthaler (n.d. p. 7) points out that "the roasted, brewed bean is still a luxury to many people; therefore drinks prepared from parts of the coffee plant which have no commercial value are often substituted. The coffee leaves are crushed, dried, and boiled in water. . . Usually salt or milk is added."

⁸In December 1971 average prices ranged from 2 to 4 dollars (Ethiopian) per kilogram.

addition, insomnia and anorexia almost always occur. Lack of or excessive use of chat by the habitu   may lead to disputes that find expression in fights, often resulting in grave injuries. Many people are held in prisons as a result of such activities and the courts are crowded with pending cases.

It is not surprising therefore that there has been a substantial reaction to the use of chat and much has been written of its evils. Older reports, particularly those generated by colonial officials (cf. Guedel et al., 1957; Report of the Qat Commission of Inquiry, 1958; Verdcourt and Trump, 1969, p. 98; and the editorial after the paper by Heisch, 1945) have tended to express the view that chat is a "drug to which it is possible to become addicted" (Peters, 1952). The word "addiction", of course, is one which must be used with the utmost care and clarity of meaning, particularly with respect to the criteria determining its appropriate assignment. Such care has been, however, sadly lacking in most of the literature concerning chat.

The most satisfactory evaluation of chat in this respect is presented in the WHO Document of 1964. "*Physical dependence* (in the sense in which it is understood for morphine and substances with morphine-like effect or of the barbiturate type) does not occur, even if some tolerance to their effects had been acquired". A few quotations from it (WHO Document, 1964) will summarize the views of the World Health Organization. Tolerance (the tendency to increase the dose during prolonged use in order to obtain the desired effects) practically "does not occur"; if it does, the doses are increased only very slowly. "Craving" and "*psychic dependence*", as the WHO Document cautions, are exceedingly difficult to evaluate. Chat, in this respect, has been ranked "like the amphetamines, perhaps lower". The report's position on any "psychic dependence" vis-  -vis amphetamines states, "Inasmuch as a craving for amphetamines exists in certain individuals, it does not generally reach the same degree as is often observed with drugs of mor-

phine-like effect". In connection with the "relatively low level of psychic dependence on chat", emphasis has been placed on the traditionally lesser degree of chat use among women than among men. Another fact emphasized in the report that one must keep in mind when considering cases of "insanity" or "poisoning" allegedly resulting from chat chewing (cf. Carothers, 1945; Heisch, 1945; Margetts, 1967, and the editorial, pp. 1-3, in Volume 22 of the East African Medical Journal, 1945) is that its dosage must be limited on the basis of its method of use; therefore "toxic psychosis as a result of abuse" occurs much less often with chat than with chemically pure amphetamine-type drugs" (WHO Document, 1964).

SUMMARY

The early history, botany, cultivation, economics and sociological aspects of the use of *Catha edulis* (Vahl) Forsk. ex Endl., commonly known as chat, have been presented in some detail with special emphasis being given to agricultural practice around Harar, Ethiopia, an area where the plant is probably native. Chat attains an average height of 2.5 to 3 meters but may occasionally reach 15-20 meters. Its tender leaves and twigs are used exclusively as a masticatory in this area although its name Abyssinian, Somali or Arabian tea indicates its use as a beverage in earlier days and some localities. Indeed, it is held that prior to the introduction of coffee and its use, people in Yemen made a decoction of chat and the use of chat even disappeared for a while from Aden and coffee drinking was substituted. The twigs of chat, with leaves attached, in bundles of fifty or so and in pieces from about 30 to 40 cm in length, form a very considerable article of commerce. The effects produced by chewing the fresh leaves are described as similar to those produced by an amphetamine or amphetamine-like stimulant, only more pleasant and agreeable when not used in excess. Chat is also an anorexiant. Chewers in rural areas use the leaves to give them energy to work and

suppress the appetite and keep them from feeling drowsy; in urban areas users chew chat as a "past-time" stimulant, appetite suppressant or as a study aid. Although chat was originally used exclusively by Moslems, its use now pervades all religions and socio-economic groups although Moslem males are still the prime consumers. The use of chat is probably of great antiquity and precedes that of coffee. Its stimulatory effects induced some Moslems long ago to class it with intoxicating substances the use of which is forbidden in the Qur'an, but a "synod" of learned Mussulmans decreed that as it did not impair the health or impede the observance of religious duties, but increased good spirits and humor, it was lawful to use it. Since that time many (including governments) have made attempts to discourage or even outlaw its use. The dilemma is that too little is known about the effects of chat and in this regard it would be of interest to have a study similar in some respects to that of the (U.S.) National Commission on Marihuana and Drug Abuse (1972) put its use in proper perspective.

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MEDICINE AND MAGIC IN CENTRAL TIGRE: A CONTRIBUTION TO THE ETHNOBOTANY OF THE ETHIOPIAN PLATEAU

R. T. WILSON¹ AND WOLDO GEBRE MARIAM

The inhabitants of the Ethiopian highlands were long isolated from contact with other societies and over a period probably in excess of three thousand years, a distinctive life-style evolved. The isolation had its effects not only on the people but also, over a very much longer period of time, on the flora. The combination of endemism in the plant life and the maintenance of primitive beliefs and superstitions in the people, in spite of an early conversion to Christianity, resulted in an extensive and unique indigenous pharmacopoeia.

Even though Ethiopia has had a written language for two thousand years, native medicines and treatments are an oral tradition—except possibly in church documents to which no layman is allowed access. This tradition has certainly played a part in the mystery attached to the cures by native practitioners. The plants used and the method of preparation are often closely guarded secrets, usually only passed from father to eldest son as the death of the former approaches. With each succeeding generation the chances of distortion or misrepresentation of the original plant or cure are greatly increased, and many mistakes are bound to occur. The impression of magic is also enhanced by the methods used in gathering and preparing the plants. Astrological influences are often invoked and, indeed, have become an integral part of the treatment.

Many of the treatments are effective, many more are harmless and have no effect except psychosomatically, while a small number are certainly dangerous. Nevertheless, more than 85 percent of Ethiopians have no chance of access to a modern physician and, usually at a late stage in their illness, have to resort to traditional medicine. While many of the supposed medicinal properties have no basis in modern science, it would be facile to dispose of all treatments in this way.

This paper is based on the personal knowledge of one of the authors, who has lived throughout his life in the Ethiopian highlands, and on observations and interviews carried out during the period June 1974 to February 1976. Plants and plant parts, where not known to either of us, have been identified in the Ethiopian National Herbarium in Addis Ababa. In addition, vernacular names have been used where appropriate, with due regard being paid to the anomalies inherent in this method of identification. The vernacular names included in Table I have been written down as phonetically as possible, there being no standard transliteration into English from the Tigrinya language current in northern Ethiopia. In this contribution we have not attempted to be exhaustive, but rather to add a little to the existing body of knowledge. For further information readers should consult, among other sources, Bally (1937), Cacciapuoti (1941), Chiovenda (1931), Getahun (1976), Innamorati (1973), Kokwaro (1976), Lemordant (1971), Siegenthaler (1960), UNESCO (1960) and Verdcourt and Trump (1969). To avoid undue repetition and for ease of reference the data are presented in tabular form in alphabetical order by genus.

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TABLE I
PHARMACOPOEIA OF THE ETHIOPIAN HIGHLANDS INHABITANTS

Latin name	Vernacular	Use	Method of use and plant part
<i>Achyranthes aspera</i> (Amaranthaceae)	Muchello	Treatment of dysentery	The roots are crushed, mixed with water and the mixture drunk.
<i>Adhatoda schimperana</i> (Acanthaceae)	Simayza	Control of lice	A decoction of leaves and stems is used for washing the body.
<i>Argemone mexicana</i> (Papaveraceae)		Lubricant	The seeds are used for oiling the tray on which the local unleavened bread is baked. In other contexts the oil of the Mexican Poppy is considered to be highly poisonous.
<i>Boswellia papyrifera</i> (Burseraceae)	Itan	Control of evil spirits and fever and as a tranquilizer	The bark and the olibanum resin extracted by a primitive form of tapping are smoked on a fire. Said to be more effective if carried out at night.
<i>Calpurnia aurea</i> (Leguminosae)	Hisawis	Control of lice	The leaves are crushed in water and the resulting liquid used as a body wash.
<i>Capparis tomentosa</i> (Capparidaceae)	Andal	Control of evil spirits	The crushed roots are burnt in the supposedly haunted place.
<i>Cissus jatrophioides</i> (Vitidaceae)	Kosli-auhi	Cure for snake bite	The crushed roots are mixed with honey and the resultant mixture drunk.
<i>Clerodendrum myricoides</i> (Verbenaceae)	Surubatri	Poison antidote	A decoction of roots is drunk.
<i>Croton macrostachyus</i> (Euphorbiaceae)	Tambuk	Treatment of tapeworm	Crushed leaves and seeds are mixed with water and drunk. Croton oil is, of course, one of the world's most powerful purgatives (Purseglove, 1968).
		Control of venereal disease	Fruits eaten and root decoction drunk.
		Inducement of abortion	Seeds eaten.
		Treatment of burns	The sap of the crushed leaves is applied to the burnt area.
<i>Datura stramonium</i> (Solanaceae)	Mezerbae	Relief of toothache	The vapor of the boiled seeds is inhaled.

TABLE I
CONTINUED

Latin name	Vernacular	Use	Method of use and plant part
		Fungicide	Dried ground leaves are mixed with butter and applied to the infected part.
		Poison	A few seeds in tea or coffee are said to cause almost instantaneous death due to heart paralysis. Local drinks—beer and mead—are often adulterated to a small extent with powdered seeds to give them more "kick"; temporary insanity, if not worse, usually results.
<i>Embelia schimperi</i> (Myrsinaceae)	Enkoko	Treatment of tapeworm	Crushed seeds are mixed with water and drunk. The leaves are also eaten as a vegetable.
<i>Erythrina abyssinica</i> (Leguminosae)	Sono	Laxative	A decoction of leaves and young branches is drunk.
<i>Foeniculum vulgare</i> (Umbelliferae)	Insillal	(see <i>Lycopersicon</i> sp.)	
<i>Hagenia abyssinica</i> (Rosaceae)	Habbi	Tapeworm expellent	The young leaves as well as dried flowers are ground and mixed with water or local beer. This is probably the most widely used worm medicine, but excess dosage may cause blindness or death. It can also be used to induce abortion.
<i>Ipomoea sinensis</i> (Convolvulaceae)	Hafafello	Relief of stomach ache	Roots are chewed and swallowed.
Loranthaceae	Dikala		A variety of parasitic plants are used as medicines, e.g. a parasite of <i>Acoanthera schimperi</i> is used as a compress to reduce muscular tension or rheumatism; <i>Loranthus 'acaciae'</i> is used in the treatment of anthrax by applying the ash to the sites of sores; and the leaves of a number of species worn in a sachet round the neck are said to ward off evil spirits.

TABLE I
CONTINUED

Latin name	Vernacular	Use	Method of use and plant part
<i>Lycopersicon</i> sp. (Solanaceae) and <i>Foeniculum vulgare</i> (Umbelliferae)	Tomatim Insillal	Treatment of gonorrhoea	The leaves of the two plants are combined, boiled in water and the resulting mixture is drunk.
<i>Maesa lanceolata</i> (Myrsinaceae)	Suwaria	Expulsion of tapeworms	Crushed seeds are mixed with water and drunk. An oil extracted from the fruits is also used for the same purpose.
		Cure of skin infections	The crushed seeds are fried in butter and applied to affected areas.
		Fish poison and molluscicide	An extraction of the leaves is said to be effective for these purposes.
<i>Maytenus senegalensis</i> (Celastraceae)	Kebkeb	Treatment of cancer	Crushed bark is mixed with water and drunk. Another species, <i>M. ovatus</i> , is known to be an important source of anti-cancer drugs.
<i>Milletia ferruginea</i> (Leguminosae)	Biribira	Cure of skin infections	Treatment as for <i>Maesa lanceolata</i> .
		Fish poison	The bark and mature fruits are crushed to a powder and applied to the surface of the water.
<i>Nicotiana glauca</i> (Solanaceae)	Tumbaku	Control of leeches	The leaves are crushed and an aqueous decoction is then used to wash the area where the suckers are attached.
<i>Nigella sariva</i> (Ranunculaceae)	Awassida	Relief of stomach ache	The crushed seeds of the plant are mixed in water and the suspension is drunk.
<i>Opuntia ficus-indica</i> (Cactaceae)	Beless	Treatment of leprosy	The flowers are crushed, mixed with honey and applied to the infected area. The fruits of this imported but naturalized plant are well liked as a sweet.
<i>Otostegia integrifolia</i> (Labiateae)	Tchiendog	Insecticide and disinfectant	The smoke of burning branches and leaves is effective for these purposes.
		Ritual cleansing	As an extension of the disinfectant principle, post-parturient mothers are smoked ten days after giving birth, when they can be released from their confinement.

TABLE I
CONTINUED

Latin name	Vernacular	Use	Method of use and plant part
<i>Oxalis anthelmintica</i> (Oxalidaceae)	Habatchego	Tapeworm expellent	The roots are either chewed and swallowed or crushed, mixed with water and then drunk.
<i>Phytolacca dodecandra</i> (Phytolaccaceae)	Shibiti	Treatment of malaria and gonorrhoea Abortifacient	The roots are crushed, mixed with water and the mixture drunk. The root is used as above. The dosage has to be regulated to avoid causing death. The roots are also used to induce abortion in animals. It is believed that the male plant cut in mid-October is most effective. A widespread use of the dried, ground fruit is as a soap substitute.
<i>Piliostigma thoningii</i> (Leguminosae)	Amam gemel	To cure uneasiness or sweating	A solution of the leaves is applied to the body or the body is fumigated with smoke of the leaves.
<i>Punica granatum</i> (Punicaceae)	Roman	Tapeworm expellent	The crushed leaves in water are drunk.
<i>Rumex hequartii</i> (Polygonaceae)	Shumbubata	Anti-rheumatic	The aqueous root extract is drunk.
<i>Sesamum indicum</i> (Pedaliaceae)	Selit	Relief of earache and hearing problems	The oil extracted from the seed is applied to the ears.
<i>Terminalia brownii</i> (Combretaceae)	Webu	Treatment of hepatitis	The crushed bark, mixed with water, is drunk.
<i>Solanum incanum</i> (Solanaceae)	Engule	Relief of stomach pains	The root is chewed and swallowed.
<i>Verbascum sinaiticum</i> (Scrophulariaceae)	Ternaka	Treatment of gonorrhoea Control of post parturient bleeding Cure of anthrax	The fruits are used (manner not specified). Crushed leaves are inserted into the vagina. Roots and leaves are crushed, mixed with honey and eaten.
<i>Vernonia amygdalina</i> (Compositae)	Grawa	Control of excessive bleeding at menstruation	The leaves are crushed in water and the mixture is drunk.
<i>Withania somnifera</i> (Solanaceae)	Agol	Control of joint infections ('arthrititis)	The crushed leaves are applied as a poultice to the affected areas.
<i>Zingiber officinale</i> (Zingiberaceae)	Zingibil	Relief of stomach ache	The rhizome is chewed and swallowed.

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Kif Cultivation in the Rif Mountains

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Kif Cultivation in the Rif Mountains

TOD H. MIKURIYA, M.D.¹

Kif is the Moroccan word for marihuana. It is a general name that covers all preparations that are smoked. These preparations are different from those encountered in North America in that only the blossoms of the mature female plant are used. Another difference is that the blossoms are always mixed with an equal amount of tobacco. Its use is widespread throughout the country among adult males as it has been for centuries.

Kif Cultivation in the Rif Mountains

Between the 20th and 23rd of August, 1966, I had the opportunity to travel in the Rif Mountain area in the province of Alhucemas, Morocco. During this period, I was able to observe the cultivation of kif (*Cannabis stiva* L.), particularly near the towns of Ketama, Taksut, Taberrant, and Tleta Ketama. Introductions and translations were facilitated by the Director of the National Co-operative of Artisans for the Province of Alhucemas. He is responsible for supervising the operations of handicraft manufacture for this province. It was fortunate that handicraft manufacture happens to take place in the kif-growing area of Morocco, since I could also observe this traditional activity.

With proper introductions by an individual with a position of some importance locally, I found the people quite hospitable and friendly. During my visit, I had a chance to share their various native dishes from the communal bowls in the center of the traditional circle. The people there were quite open about answering any of my many questions. At the same time, they were fully aware of the "illegality" of the kif. Even the children of the villages that I met knew that it is forbidden to take kif into the lowlands. During this visit, I talked with law enforcement officials, local farmers and with village officials.

The Rif are a chain of mountains stretching across the northernmost area of Morocco. Except in the highest elevations (7,000-8,000 ft), they are generally hot and dry. The terrain of the Rif Mountains is

quite rugged. The slopes are steep and rocky, often dropping several thousand feet to narrow canyons below. In the central region of the mountains, there is a small flat plateau. The village of Ketama is located at its western edge.

The area surrounding this central plateau is strongly reminiscent of many areas of the western United States, such as northern California or Colorado. There are small, rather scanty stands of fir trees on the upper elevations. In the lower areas, the vegetation is mostly low shrubs and grasses. During the short winter from November to March, there may be as much as 2 or 3 m of snow at the higher elevations.

Kif is grown in an area in the Rif Mountains, approximately 150 km northeast of Tangier. The kif-growing area itself is a triangle with the base an imaginary line drawn east to west from a point approximately 10 km west of Tarquist, ending about 10 km east of Bab Taza. The legs of the triangle converge in the area of Taberrant to the south. The area included in this triangle is approximately 1,000 sq. km.

Ketama is reputed to be the center of the growth area; and the town reputedly producing the most kif in Asia, some 15 km to the southeast.

While the main roads are generally well surfaced macadam, the grading is poor due to the use of hand tools for construction instead of earth moving equipment. These roads are generally kept open all year. There are just four or five towns actually located on the first class roads in this area. Many of the towns in the area are located on extremely poor dirt roads leading back in the hills. These roads are so formidable that it is not possible to drive any faster than 15 or 20 mph. At several places, there were gangs of

¹ New Jersey Neuro-Psychiatric Institute, P. O. Box 1000, Princeton, N. J. 08540.

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workmen attempting to improve and maintain the road with pick and shovel. These roads wind along the faces of steep cliffs. There was evidence of frequent slides.

There is little, if any, rural electrification. Most of the towns had no electric or telephone lines leading to them. When telephones and electricity were in evidence, they usually ran to the small outposts of the national police. Outposts seemed to be located in each small town along the main road but only sporadically along the secondary roads.

Many of the valleys in this area where the kif is grown are inaccessible by motorized vehicle. The crops are brought to one of these secondary roads by donkey.

The villages that are off from the main road bear very little resemblance to villages along the main road or in the lowlands. They appear not to be villages as such but rather collections of houses spaced within 0.5 km of one another in these very steep canyon valleys. There are no interconnecting roads for vehicles but only winding donkey paths.

This area is populated chiefly by various Berber tribes. Many of the people cannot speak any language except their native dialects. They oftentimes cannot speak Arabic. In most towns, however, Arabic is spoken and, occasionally, French and Spanish as secondary languages. For this reason, perhaps, they are not easily assimilated into the cultures of the "European" cities of the coast or the "Arabic" cities of the plains and foothills. For perhaps a thousand years they have rather successfully resisted outside influences from a succession of invaders from the Phoenicians and Romans to the French and Spanish. There is at present some sympathy in this region for Abdul Krim, an old aspirant to power.

The Berbers have a strong sense of ownership of private property, knowing exactly whose field is whose. The various families through the generations have taken much effort to build and maintain the neatly stone terraced fields that sit precariously on the steep rocky slopes. Throughout North Africa, these people are referred to as "The Berber Problem" because of their resistance to assimilation.

Oftentimes, along the road and in these isolated "villages," I saw men carrying rifles

of ancient vintage on their backs. When I asked about this, I was told that it was not really a rifle but "just part of tradition."

A typical town off the main road is Taksut. Taksut is located in one of the myriad steep, craggy canyons so characteristic of the central Rif Mountains. The barren, gray micascist walls tower over the narrow steep floor of the canyon. The fields are terraced with local stone in order to create level ground for the cultivation of crops. Small, flat-roofed adobe-like houses are spaced several meters apart, surrounded by the family fields.

Taksut is not on the rather complete Michelin road map. It is located about 70 km southwest of the town of Targist off the main road. The town is at the end of a spur of the road which is of such a primitive quality that only large trucks and four-wheeled vehicles may safely pass. At the time of deep snowfall during the short winter, it is isolated from the rest of the world. The "road" comes to an abrupt rocky end on the outskirts of this town. There are no streets but steep and crooked paths for donkeys, interconnecting the various houses. The center of the town is just across a foot-bridge and up through some large boulders. There is only a small, flat space of dirt around which are clustered a few houses and two tiny general stores. The buildings are often built around the boulders or perched on top. There is a small stream nearby. There is no city hall, no post office, no evidence of government services of any kind. There is neither telephone nor electricity nor evidence of a modern sewage system.

As one goes from the center over the tortuous trails, one finds the outlying houses surrounded by the family plot of ground. The fields are still more rock than dirt, although much work has gone into clearing rocks. The terraces of these fields are made from the rocks cleared from the fields.

The fields around Taksut are planted with about 50% kif and the remainder in corn, wheat, legumes and truck garden crops, such as tomatoes and melons. Besides this agriculture, the town is supported by artisans working in the home. Taksut has no one speciality in handicraft but rather an output of several individuals who specialize in different items. Typical items are leather has-

socks, leather purses and handbags, rugs, pseudo-antique firearms, and hand tied rugs.

The population of this little town-valley was estimated by some of its residents to be between three and five hundred.

The economy of this area is almost solely supported by the cultivation of kif. In the central areas of growth it is the only crop. The individuals involved in kif production in the central region of the kif-growing area must purchase staple goods rather than grow them themselves. On the peripheral areas, however, more of the other crops are in evidence. These are apparently both for local consumption and limited cash crops.

The people in the village of Taksut said that about 50% of the crops planted in their valley was kif, with the remaining 50% other crops. There appeared to be even less growth of kif and more growth of other crops in Tabarrant. Although no accurate estimate can be made of the total area and the yield, the area planted in kif would be in the thousands of square kilometers, with an output in the range of thousands of kilograms of marketable product.

The corn and wheat crops are of very poor quality, with yields of perhaps less than one bushel per acre. Concerning the yield of kif, the average is estimated by the local farmers as being two kilograms per square meter of marketable product (dried tops and stems, the leaves are not included). The farmers receive five dirham (1 dirham = 20¢) per kilogram of this product from individuals who come up from the lowlands with trucks to take the product for distribution to the cities. The selling price in the cities jumps up to upwards from 15 to 50 dirhams per kilogram. Further refined products bring up to 200 dirhams per kilo. The refining consists of separating the blossoms from the stems and the seeds for smoking. The blossoms are then mixed with an equal amount of a high grade of local tobacco which is grown primarily in other sections. I did not see any cultivation of this tobacco in evidence in the area visited. Kif is planted in this high mountainous region early in March, shortly after the spring snows have thawed. It is harvested during the month of August and early September.

The government attempts to practice a policy of containment, allowing no new

areas of kif cultivation, while allowing those already in production to be maintained. The control of this area by the government is somewhat functional since, in Tabarrant, a comparatively inaccessible town, the national gendarmerie had destroyed several acres of kif growing there within the past month.

Along the main road at Babtaza, Bab Berred, Ketama and Targist, there are barricades and national gendarmerie outposts. When I enquired as to what these were for, I was told that, at night, all trucks that pass through this area are searched. During informal conversations with the chief of the national gendarmerie for the Alhucemas Province, I learned that they are really not concerned with individuals taking one or two kilos of the product out of the area either nationals or tourists, but more with nationals taking the kif out for purpose of re-sale. I was told that most of the Moroccans who pass through the area have their luggage inspected at various bus stops. In my travels, however, I saw no evidence of this occurring when a bus happened to be stopped. There are outposts of the national gendarmerie at all of the towns on the main road and in many of the towns in the hills. They have telephones and, in some instances, short wave radios for communications.

Along one of the dirt roads, I saw a weighing station, where some farmers had brought the dried kif for pickup for shipment to the cities of the lowland. Unfortunately, I was not able to find out more data concerning the transport arrangements from this growing area to the cities. This regulation of kif is apparently a very complicated matter handled by the Moroccan Government in ways that I could not comprehend. It is apparent that large vehicles must be used for transporting the huge amount of kif grown to the areas of consumption, but the exact arrangement for passing out of the area is to me unclear. It seems that there must be some way of obtaining government "approval" for transport to enable these vehicles to take the crop out of the area.

The cultivation of kif in Morocco has been carried on for hundreds of years. The total consumption of kif in Morocco is measured in the thousands of kilograms per year.

There is a situation of chronic unemployment in Morocco. The migration of Berbers,

who have no industrial skills and who are not assimilated into either Arabic or European culture, complicates matters further. In 1965, Casablanca experienced riots that necessitated seven days of martial law. These riots took place primarily in a slum area on the edge of the city populated primarily by "displaced" Berbers.

Five years ago there was an attempt to burn the kif fields in the Rif mountains, but this government effort was met with armed opposition. The government ceased its endeavor, when it became apparent that this would be a long and costly struggle. Because of the rugged terrain and the poor communications, effective resistance to a government campaign would be quite easy. Pressures from the people in the cities who traffic in the huge quantities of kif would not be insignificant.

The deprivation of these people in the growing area of their chief, and often, sole cash crop would drive them from their marginal rocky land further to inflame the unemployment problems in the cities.

These observations and inferences illustrate the complexity of the problem of kif cultivation in Morocco. First, there is the barren, marginal soil, on which little else can be grown. Secondly, there are the rugged terrain, poor roads, and poor communication. Thirdly, the tradition of this unassimilated group of people is one of resisting outside influence. When these factors are combined with the large vested interests in transport and distribution as well as a chronic unemployment situation, it is doubtful that any significant reductions of kif cultivation can be effected. It appears that this situation of stalemate between the central government and the Berbers of the Rif Mountains will continue for the foreseeable future.

Needless to say, investigation of possibilities for the introduction of substitute cash crops is essential to an eventual solution of the problem. No agricultural test stations were seen in the kif growing area. At this writing effective measures seem many years away.



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Mushrooms in Yoruba Mythology and Medicinal Practices

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Mushrooms in Yoruba Mythology and Medicinal Practices¹

B. A. Oso²

The Yoruba people of southwestern Nigeria (Oso, 1975) are rich in culture and have a lot of myths, which explain the origin and behavior of many things in their environment and daily life. The Yoruba name for God is *Olodumare* (*Olorun*, i.e., the owner of Heaven). It is the belief of the Yoruba that in matters pertaining to omniscience and wisdom, *Olodumare* has a deputy on earth known as *Orunmila*. Traditionally, the Yoruba believe that *Olodumare* has endowed *Orunmila* with special wisdom and foreknowledge to the end that he may be His accredited representative on earth in matters relating to man's destiny. Oral traditions emphasize the part played by *Orunmila* in guiding the destinies both of the divinities and of men. One reason given for his intimate knowledge of matters affecting a man's destiny is that he is present when that man is created and his destiny sealed. Therefore he knows all the secrets of the man's being. Thus he can predict what is coming to pass or prescribe remedies against any eventuality. He is in a position to plead with *Olodumare* on behalf of man so that unhappy issues may be averted or rectified. Hence the Yoruba usually consult *Orunmila* to find out about the future or what the outcome of an enterprise may be, or when in trouble, what they could do to get out of it. Also, when the Yoruba are urgently in need of certain things they consult *Orunmila* to find out what they could do in order to get them.

Ifa, the god of divination, is one of *Orunmila's* messengers, the messenger of light, through whom *Orunmila* communicates with men and they with him. *Ifa* is consulted through the diviner known as *Babalawo* (the priest of *Ifa*), who understands the lan-

guage of *Ifa* and by virtue of this he's also a traditional doctor.

The Yoruba have recognized mushrooms for many years, inasmuch as such fungi have always played an important role in their everyday life. They have descriptive Yoruba names for the different species of mushrooms (Oso, 1975) as well as mythical stories and beliefs which explain the origin of some of them. These myths and beliefs sometimes play a role in determining which of the mushrooms are edible and which of them may be used for medicinal purposes by the Yoruba native doctors. During the course of this research many Yoruba people, mainly the traditional doctors and the elderly people, were interviewed to determine their knowledge of the fungi, particularly in relation to their origin and medicinal uses. This paper gives an account of the mythical origin and uses in Yoruba traditional medicine of a few of them.

TERMITOMYCES MICROCARPUS (Berk. & Br.) Heim

Known in Yoruba as *Olu-Oran*, *T. microcarpus* is a fungus with small fruit bodies that grow in groups spreading over a large area of soil. It grows in contact with termite nests under the soil.

A Yoruba myth has it that many years ago there lived a woman whose name was *Oran*. She had no issue, and being much worried by this, she went to *Orunmila* to find out what she should do to have children. *Orunmila* examined her destiny and told her that she would have children, but not until she had made a sacrifice to appease the gods. For this sacrifice she was to provide sixteen chameleons, sixteen fowls, and a large quantity of maize grains, the number of which would determine the number of children she would have. *Oran* brought all these materials to *Orunmila*, who made the sacrifice and then gave *Oran* a certain medicinal preparation

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which he instructed her to start eating once daily. He further instructed her to provide a large piece of white cloth which she would be using to cover the offspring when she started getting them. Soon *Oran* started to have issue and within a short time the offspring became numerable. These offspring are the mushrooms, *T. microcarpus*, which have since been known as *Olu-Oran* (Yor. *Olu* = mushroom, i.e., *Oran's* mushrooms).

The Yoruba have a certain belief that this mushroom is capable of changing its form to assume the stature of the first person to see it when just emerging from the soil, i.e., if the first person to see it is stout the mushroom will develop a stout stipe and vice-versa. This characteristic can be related to the nature of the chameleon which was among the materials for the sacrifice in the myth above. The mushroom grows in large numbers covering a large area of soil, a growth habit which can be related to the large number of maize grains in the materials for the sacrifice. When growing in groups, the mushrooms present an appearance similar to that of a white mantle on the soil, an appearance which can also be related to the large piece of white cloth which *Oran* had provided for covering the offspring.

Orunmila had earlier advised *Oran* to make another sacrifice so that her offspring might not form food for human beings, but *Oran* did not heed the advice; all she was after was just to have children. No sooner had she started having them (offspring) than they were discovered to be edible by men, who started collecting and eating them. This, in the Yoruba belief, was how the eating of *T. microcarpus* started.

Medicinal Uses

Termitomyces microcarpus is used medicinally by Yoruba native doctors as an ingredient in the preparation of a charm supposed to bring good luck, particularly to traders. To prepare this charm, 200 fruit bodies of *T. microcarpus* are pulverized by roasting in a pot together with ripe bananas, pawpaw, salt and some other herbal ingredients. The preparation is collected on a piece of white cloth and certain magical verses are recited on it. This is then tied with thread and hung above the door of the trader's shop. It is

strongly believed that this has the power of promoting the sale of articles by drawing the buyers into the shop. The power with which *T. microcarpus* had been endowed in the above myth to grow in large numbers is supposed to be effective here in drawing people in large numbers into the shop.

Termitomyces microcarpus is also used in combination with other ingredients in a propitiation to the gods for increased population in towns and villages by reducing mortality rate. The power of *T. microcarpus* to grow in large numbers is also believed to be the effective force here.

Curatively, the Yoruba traditional doctors employ *T. microcarpus* in a medicinal preparation for the treatment of gonorrhoea. The medicine, which is administered orally, is prepared by pounding a large quantity of the fruit bodies of the fungus with the pulp of the fruit of *Cucurbita pepo* Linn., the leaves of *Cassia alata* Linn. and some other ingredients.

TERMITOMYCES ROBUSTUS (Beeli) Heim.

Another fungus which has featured prominently in Yoruba mythology and medicinal practices is *T. robustus*. It has large fruit bodies which grow in contact with termite nests under the soil (Oso, 1975). Known in Yoruba as *Ewe* (Yor. *we* = expand, i.e., the mushroom with expanding pileus) or *Ogogo* (the meaning will be found in the mythical story below), *T. robustus* is the most popular edible mushroom with the Yoruba.

A Yoruba myth tells us that in the distant past *Ogogo* was a man with ill luck who never succeeded in anything he put his hands to. Extremely worried, he went to *Orunmila* to divine how to find out the cause of his perpetual ill luck and what could be done to improve it. *Orunmila* examined his destiny and told him that a sacrifice would have to be made and his head washed with a specially prepared infusion of leaves. He told *Ogogo* to provide a pigeon, an unused sponge and three and a half pence worth of African black soap. *Orunmila* then found the medicinal leaves with which he prepared the infusion after sacrificing the pigeon. He then led *Ogogo* to a tree, *Anona senegalensis* Pers., in a nearby forest. There, with the sponge, the

soap and the infusion, he washed *Ogogo's* head seven times at seven different spots round the tree. On their way back home *Orunmila* informed *Ogogo* that after nine days they would pay another visit to the tree and if any special sign could be detected around it, it would be taken as an omen that he had been cleansed of his ill luck. On visiting the tree on the ninth day they discovered mushrooms shooting out in large numbers from the seven spots where the washing had been done. *Orunmila* then told *Ogogo* to rejoice for that was a sign that his ill luck had been removed. He asked *Ogogo* to gather the mushrooms which, on getting home, they cooked and ate. They, and all those who ate out of it, found it very tasty. *Orunmila* then named the mushroom after *Ogogo* as *Olu-Ogogo* (Yor. *Olu* = mushroom; i.e., *Ogogo's* mushroom). News of this highly flavoured mushroom spread through the village and beyond and everybody was anxious to taste it. People rushed to the spot to collect the mushroom periodically and later its growth spread to other areas. This great rush for the mushroom persists today.

And from that moment, *Ogogo's* luck became considerably improved. He was well respected and whatever business he undertook ended in huge success. Soon he was made the village Head and he ruled honourably.

Medicinal Uses

The traditional doctors have since used *T. robustus* in the preparation of charms for good luck. One way in which the charm is made is by roasting the mushroom together with chalk and the wood of *Pterocarpus osun* Craib and divining on it. This is mixed with African black soap and used for washing. It is supposed to bring good luck to anyone using it. The charm is also prepared by roasting the mushroom with the bark of *Ceiba pentandra* Gaertn. and that of *Adansonia digitata* Linn. and divining on it. This is eaten periodically.

Apart from this, *T. robustus* is used medicinally as a remedy for *Maagun*.³ This remedy

³ *Maagun*: This is a magic drug put on a woman, unknown to herself, so that when she commits adultery it may cause her paramour to fall over three times and die. The effect of *maagun* on the paramour may assume

is prepared by pounding the mushroom with *Loranthus* species growing on *Jatropha curcas* Linn., the fruits of *Piper guineense* Schum. & Thorn. and some fresh pork. The compound is collected in a bottle and thoroughly mixed with lime juice and Schnapps and administered orally.

TERMITOMYCES GLOBULUS

Heim & Goossens

Termitomyces globulus is another mushroom that grows in contact with termite nests in the soil. It is known in Yoruba as *Olubeje* (Yor. *Olu* = mushroom + *ibi* = place, spot + *meje* = seven, i.e., a mushroom growing in seven different spots). The mushrooms grow in large groups on soil and as many as seven groups may be produced within short distances of each other.

The origin of this growth habit could be found in a Yoruba myth that tells us about a poor and miserable woman who used to live in one village in the olden days. One day this woman went to the forest to fetch firewood, and there she found some mushrooms growing. She gathered these and took them as a present to an *Ifa* priest who told her that he did not eat mushrooms. However, for her kind gesture, the *Ifa* priest promised her a favour. He said by means of his magical powers he would make the mushrooms grow in larger quantities so that she could collect and sell them for as much as 16 Cowries⁴ and thereby be relieved of her poverty for life. In those days anybody who owned as much as 10 Cowries was a rich person. The *Ifa* priest then divined on the divination sand⁵ and gave this to her, instructing her to return to the spot and sprinkle the sand all over the place and call on the mushroom to appear in larger numbers. On visiting the place after doing this, the woman discovered that the mushroom had grown there in large groups and she was able to count at least seven groups in the area. These she collected and sold for 16 Cowries and thus became a rich woman.

different forms, e.g., constant coughing, somersaulting, extreme lassitude, haemorrhage, etc.

⁴ *Cowries*: Small shells used as native money in parts of Africa, India, and Asia in the past.

⁵ *Divination sand*: Fine white sand sprinkled on the divining board on which the oracle is consulted by the diviner. Wood dust is also used for this purpose.

This in the Yoruba belief was how *T. globulus* started growing in groups, and the practice of sprinkling sand on where it grows in order to make it grow still persists today. Instead of using the divination sand, however, people now use ordinary sand.

Medicinal Use

Hunters prepare a magical prescription of the mushroom chewed with seven seeds of *Aframomum melegueta* K. Schum. and the leaf of *Phyllanthus floribundus* Muell. When this is spat on the palm and rubbed on the gun or the bow and arrow with some incantations, the hunted game becomes drowsy and easy to kill.

CALVATIA CYATHIFORMIS (Bosc) Morgan

The Yoruba people strongly believe that *C. cyathiformis* is produced by the bush-fowl (*Francolinus bicalcaratus*). Hence the Yoruba name for the fungus is *Iso-aparo* (Yor. *iso* = effluvium + *aparo* = bush-fowl).

A Yoruba myth tells us that centuries ago the bush-fowls, in a bid to gain recognition among farmers, went to *Orunmila* to divine. They complained to *Orunmila* that mating with each other usually left no visible mark, it only resulted in a discharge of effluvium by the females and because of this the farmers had no regard for them. They appealed to *Orunmila* to help them so that the effluvium discharged subsequent to mating would result in something that would be of value to the farmers, as this was the only way they could win their recognition. *Orunmila* divined for them and asked them to sacrifice ten eggs to the gods. They brought the eggs and *Orunmila* made the sacrifice. Since then wherever there was mating between a male and a female bush-fowl, this fungus usually appeared a few days later. Farmers then started collecting and taking them home to show the people and to eat them. This in the Yoruba belief is the origin of *C. cyathiformis*.

Medicinal Uses

The origin of this fungus as contained in the above myth determines its uses medically.

Ground with another fungus, *Daldinia concentrica* (Bolt. ex Fr.) Ces. & De Notaris, and mixed with the African black soap, it is a remedy for leucorrhoea. The soap compound is used by the patient for washing her vagina at prescribed intervals.

As a cure for a disease known in Yoruba as *Maasomaaso*, *C. cyathiformis* is ground with some other herbal ingredients and administered orally. This disease, strongly believed to prevent pregnancy, is commonly described by the Yoruba people as a condition in which a woman begins to discharge effluvium through her vagina. It is probably the disease known in orthodox medicine as pneumaturia.

DISCUSSION

Fungi have been associated with fairies, witches, superstitions, mythical beings and legends since mediaeval times. The ancient beliefs and superstitions about the "Fairy Rings" as well as the association of *Hirneola auricula-Judae* with Judas Iscariot are well known. Puff balls were once believed to be sown by spirits. *Exidia grandulosa* has been referred to as "Fairy Butter" in the Northern counties of England where it was believed that the fungus is made in the night and scattered about by the fairies. The same fungus has been associated with witches in some other countries and termed "Witches' Butter." Another belief which is still prevalent in Sweden is that trolls milk the cows and scatter the butter from which *E. grandulosa* originates. Hence, it is known as "Troll's Butter." In certain parts of England puff-balls are termed "The Devil's Snuff-Box," while in Scotland where their spores are believed to cause a type of blindness, they are known as "Blind Men's Een."

As far back as the 5th Century B.C. fungi have played a prominent role in medicinal practices. *Polyporus officinalis* has been used both as a counterirritant and as a universal remedy for all complaints and disorders. *Boletus edulis* has also been employed as a cure for a number of different complaints. In mediaeval times therapeutic applications of fungi have been made arising from the superstitious beliefs relating the appearance of a particular fungus to some purpose for

which it was supposed to be suitable. Among such fungi was the Jew's Ear, *Hirneola auricula-Judae*, which owed its reputation in throat cases probably to the fancied resemblance of its hymenial surface to the fauces. *Elaphomyces granulatus* was formerly regarded as an aphrodisiac and used in the preparation of love potions. In West Surrey and Sussex *Daldinia concentrica* was carried until quite recently by old men as a charm against cramp.

All these and similar beliefs and applications are well treated by Rolfe and Rolfe (1925). However, prior to the recent series of studies by the author (Oso, 1975, 1976, 1977) little was known on how the various ethnic groups in Nigeria relate to and use mushrooms in their daily life.

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Tabernanthe iboga: an African Narcotic Plant of Social Importance

HARRISON G. POPE, JR.¹

Tabernanthe iboga is an apocynaceous shrub native to the forests of Gabon and the northern Congo. First described in the late 1800's, it has been reasonably well studied by botanists. The roots of T. iboga contain several indole alkaloids, of which the most important, ibogaine, is a central stimulant and in large doses an hallucinogen. In Gabon, the roots are used in the initiation rites to a number of secret societies, of which the Bwiti is most famous. The plant remains to this day a central feature of local religion, and its spectacular effects have hampered native acceptance of Christianity in Gabon.

Introduction

Starting in the mid-1800's, a number of French and Belgian explorers began to report a remarkable plant that grew in Gabon and the Congo. It was a shrub about 3 or 4 ft in height, found in the wild and also cultivated in the vicinity of the native huts. The natives claimed that the root bark was a powerful stimulant and aphrodisiac; it doubled their muscular strength and endurance and enhanced their sexual prowess. A few tribes, especially in the Gabon area, discovered that larger doses of the roots would produce fantastic visions, although this amount could sometimes cause death as well. They soon incorporated the plant into the initiation rituals of their secret cults.

The discovery of the plant, indeed, may not have been by man but by boars in the jungle. Several accounts mention that the natives saw boars dig up and eat the roots of the plant, only to go into a wild frenzy, jumping around and perhaps fleeing from frightening visions. Porcupines and gorillas, according to the natives, occasionally did the same thing. At any rate, the human use of the plant was widespread by the time it was first observed by Europeans.

The earliest specimens of the plant to appear in Europe were brought from Cap Lopez in Gabon by Griffon du Bellay. His description, probably the first published, appeared in 1864 (98): "Iboga is not toxic

except at high doses in the fresh state. In small quantities, it is an aphrodisiac and a stimulant of the nervous system; warriors and hunters use it constantly to keep themselves awake during night watches. . . ."²

In 1889, Professor Henri Baillon offered the first botanical description of the plant (7). He named it *Tabernanthe iboga*, although he cautioned that the plant might later be accommodated in the neighboring genus *Tabernaemontana*. Later, Stapf described a number of other *Tabernanthe* sp. (there are now seven) and stabilized the genus.

By the turn of the century, chemical investigation of the roots of *Tabernanthe iboga* was underway, and in 1901, its principal alkaloid, ibogaine, was isolated (36, 37). A flurry of studies with animals showed that ibogaine was indeed a potent central stimulant. Although Phisalix suggested in 1901 (40) that the drug could produce hallucinations, it was not until recently that the hallucinogenic properties of ibogaine were clearly established, thus confirming the many published accounts of native use of the root in initiation rites.

During this century, *Tabernanthe iboga* has been the subject of scores of chemical and pharmacological studies, most of them French. New observers in Gabon and the Congo have described the increasing native use of the plant. But little has been done to bring together this material, except for a few theses in French and German, all more than 15 years ago (1, 2, 3, 5). The purpose of this paper is to present, for the first time in English, an up-to-date summary of what is

¹ Botanical Museum of Harvard University, Cambridge, Massachusetts. A term paper in Biology 104, "Plants and human affairs," Harvard University, 1968.

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² Translation mine for all French references.

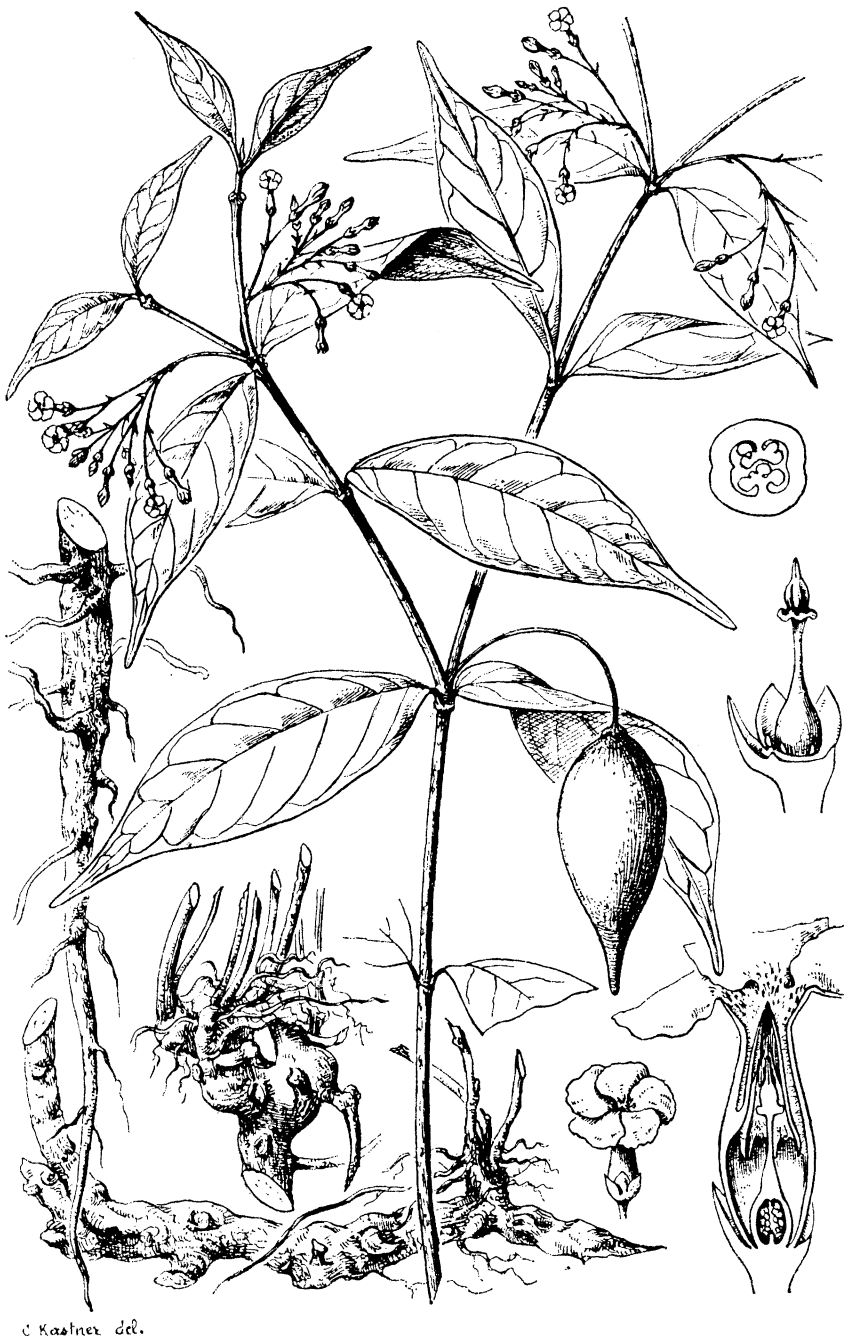


Fig. 1. *Tabernanthe iboga*. From Albert Landrin (4).

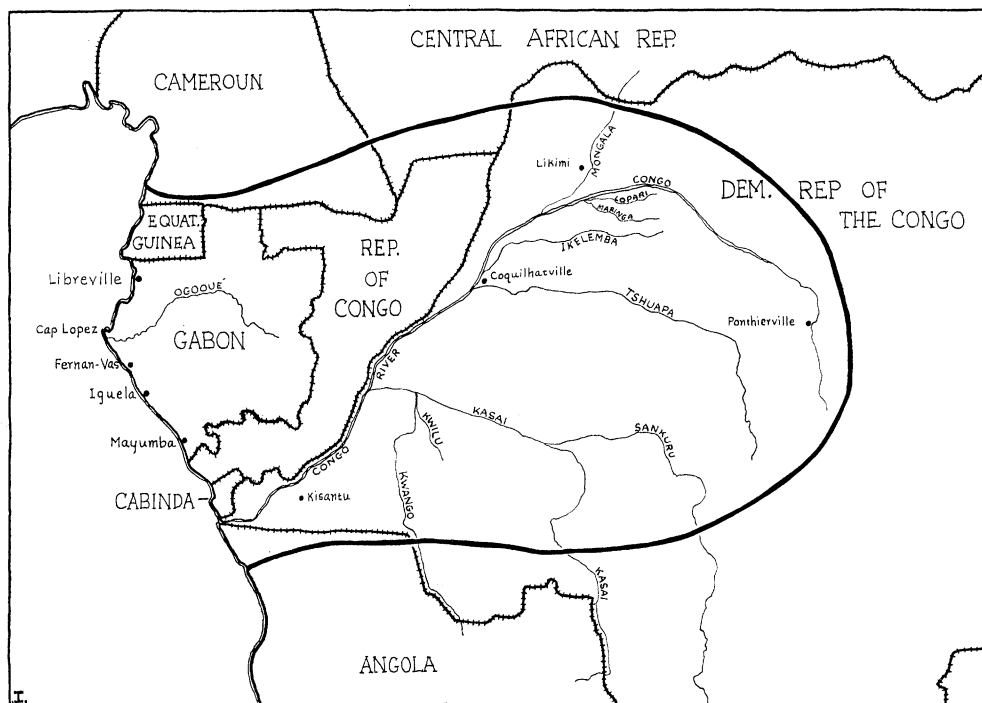


Fig. 2. The range of *Tabernanthe iboga*. Towns, rivers, and other localities named on the map are places from which the plant has been reported (see references 4, 14, 16, 31, and 35).

known about *T. iboga*. It places special emphasis on the ethnobotanical importance of the plant, partly because this is the area of the writer's greatest interest and competence, and partly because previous work has almost entirely neglected this important aspect. As will become evident in the paper, *T. iboga* has had considerable social influence in the area where it grows.

Botanical Aspects of *Tabernanthe iboga*

The following botanical material is drawn from a number of writers, notably Baillon, Landrin, Stapf, Raymond-Hamet, Delourme-Houdé, and Dubois. Of these, the last (16) is the most recent and probably the best, and hence much of this description is drawn from his work.

Tabernanthe iboga is an apocynaceous shrub, from 0.9 to 1.5 m in height, usually growing in the undergrowth of tropical forests. The leaves are borne in opposing pairs and measure about 9–10 cm long and 3 cm wide, although sometimes they reach

21 cm in length and 7 cm in width. They are oval in shape, acuminate, smooth, rather soft, yellowish green underneath. The petioles are about 0.2 cm in length. The flowers are very similar to those of the related genus *Tabernaemontana*, with a quincuncial calyx and a hypocrateriform corolla with twisted lobes. The base of the ovary is slightly thickened, in a glandular yellow bed. The anthers are arrow-shaped and acuminate like those of *Tabernaemontana*. There is only one ovary, with a single cavity and two parallel placentas with many ovules joined to them on the underside. The flowers grow in groups of 5–12 on slender peduncles from the points at which the branches are joined to the stem. Indeed, several branches, a pair of leaves, and a group of flowers may grow from the same point.

The flowers are rather variable in color, from yellowish-white to pinkish-white, or sometimes white with pink patches, very small, with the calyx reaching a maximum of about 0.5 cm in length. The calyx is deeply divided into five parts which are

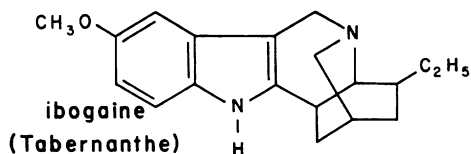


Fig. 3. Structure of ibogaine

tightly wrapped together. The corolla, as already indicated, is long relative to its width, with a flat spreading limb at right angles to it. The corolla reaches about 0.6 cm in length and the lobes, about 0.3 cm. The anthers are about 0.2 cm long, and the style is typically 0.15 cm in length.

The fruits contain essentially none of the root alkaloids, although the seeds contain small amounts of other alkaloids (not studied to date). The fruits are oval, about the size of an olive, yellow-orange, usually hanging in pairs. They are about 5 cm long, generally ending in a point which sometimes is slightly curved. The pericarp is smooth, about 0.2 cm thick. The mesocarp is pulpy and white. The brown seeds are about 0.3 cm long and 0.25 cm in diam, each fruit with from 20–30 of them.

The stems, which contain small amounts of the alkaloids, vary from 0.2–2.0 cm in width. They contain also a large amount of latex, with a vile odor typical of all the members of this and related genera. The branches are often curved and bent back on each other, and scars are sometimes visible at the points where the branches are attached.

The roots, where most of the alkaloids are found, are rather similar to those of *Rauwolfia*, another apocynaceous genus with indole alkaloids in the roots. The bulbous mass at the apex of the root system, just below the ground, varies from 2–10 cm in diam, depending on the age of the plant. The individual roots, branching in all directions from this mass, may extend between 50 and 80 cm in the mature plant. It is the bark from these roots, especially the smaller ones, that is most preferred by both the wild boars and the natives. The color of the roots is brown in the fresh state and gray when dried.

There are dozens of native names for *Tabernanthe iboga*, varying from tribe to tribe. The most common is "iboga," but it

is also known as "éboga," "boga," "libuga," "bocca," "ébogé," "lébogo," "lébuga," "dibuga," "diboga," "dibuyi," "dibugi," and several other similar names.

Tabernanthe iboga is often confused with *T. manii* and to some extent with other members of the genus. In Gabon, many tribes distinguish between the two. Walker (35) offers the following comparison:

T. iboga: Elongated fruits, ending in a point; corolla about 0.5 cm long. Native names: mbasoka (Mitsogo tribe), kuta mbasoke (Apindji), moabi (Bavungu), gifuma (Eshira).

T. manii (probably): Ellipsoidal fruits, shaped like tiny lemons; corolla about 0.8 cm long. Native names: nyoke (mitsogo), dinyoke, oabé (Apindji), mungondu (Bavungu, Eshira).

It is worth noting at this point that at least one pharmacological study was carried out using *Tabernanthe manii* rather than *T. iboga* (54). There is no reason to think that this investigator may have misidentified his material, inasmuch as the two plants have very similar reported pharmacological properties.

Tabernanthe iboga is a very common plant in many of the areas where it grows, although in some parts of Gabon it has become rare as a result of excessive use. It has been reported throughout Gabon, and from a number of places in the Congo: Coquilhatville, the basin of the Nsele River, the Tshuapa, the Maringa, the Lopori, the Ikelemba, the Sankuru, and the Kasai. It is also very common in the Kwango and Kwilu areas, and also near Likimi and Ponthierville. Fig. 2 traces its known range.

The Alkaloids of *Tabernanthe iboga* and Their Pharmacological Properties

The chemical study of the alkaloids of *Tabernanthe iboga* began in 1901, when ibogaine was isolated from the dried root material by two pairs of investigators, Dybowski and Landrin (36) and Haller and Heckel (37). Ibogaine is by far the most abundant alkaloid in the roots, and it is responsible for most of the pharmacological properties. Its structure, shown in Fig. 3, contains the indole nucleus typical of many hallucinogenic drugs. Starting in 1942 other

alkaloids were found, the most important being tabernanthine, ibogamine, and iboluteine. All are quite similar to ibogaine in structure. At the present time, at least 12 alkaloids are known in *T. iboga* (80).

The study of Delourme-Houdé (66) found 1.0–2.6% alkaloids in the roots and 5–6% in the root bark. These figures are probably lower than they would be for fresh material, because ibogaine tends to oxidize in solution and presumably in the undried root bark as well. The seeds contained a different alkaloid that gave strong lines in a spectrum analysis, but Delourme-Houdé did not have enough material to isolate it.

The pharmacological effects of ibogaine may be divided into three parts. First, ibogaine is a cholinesterase inhibitor. This was well established by Vincent and Sero (63) in 1942. They found that the crude extract of iboga root was considerably more potent than pure ibogaine in this respect, and they correctly theorized that other alkaloids in the extract were responsible for this difference. In 1960, Raymond-Hamet and Vincent carried out a study of the three lesser alkaloids just mentioned (83). All were found to be potent cholinesterase inhibitors.

In man, the principal effects noted as a result of the cholinesterase inhibition of ibogaine are hypotension due to decreased cardiac output and stimulation of digestion and appetite.

The second effect of ibogaine, by far the most prominent, is strong central stimulation. Landrin (4) first studied this effect in frogs, guinea pigs, and dogs. The effects were similar to a large dose of caffeine in all three animals. Toxic doses sometimes produced convulsions, almost invariably paralysis, and finally an arrest of respiration. The recent study of Schneider and Sigg (78), using cats and dogs, confirmed Landrin's findings. Using eight-channel electroencephalographic recording, they determined that one of the sites of action of ibogaine is in the ascending reticular formation. Studies of reflexes in this experiment excluded a strychnine-like component in the action of ibogaine. This is highly consistent with Landrin's data. Landrin found paralysis rather than strychnine-like convulsions in the final stage of ibogaine poisoning.

Very little has been done to study the central effects of ibogaine in man. The best information was reported by Pouchet and Chevalier in 1905 (42). They recorded that a Dr. Huchard was using doses of 10 to 30 mg for influenza, convalescence from infectious disease, neurasthenia, and a few cardiac disorders. He found that the drug improved appetite, muscle tone, and general rate of recovery. He also noted a mild euphoria in almost all of his patients, similar to that produced by other stimulants.

By far the least studied effect of ibogaine is its ability to produce hallucinations. This was first suggested in 1901 by Phisalix (40). After an injection of ibogaine, his dogs acted as if they were seeing frightening things; they would suddenly begin to bark loudly at nothing, leap backwards, or try desperately to hide in a corner. Nearly 60 years later, Schneider and Sigg, in the study already mentioned, observed very similar behavioral changes in both cats and dogs. The animals exhibited ataxia, peculiar positions of the legs, partial piloerection, pupil dilation, alertness, outstretched tails, and increased respiration—a picture of fear or rage.

Of course, many of these behavioral observations could be interpreted as due to the central stimulant properties of ibogaine, or it could be hypothesized, as Turner (73) and Gershon and Lang (85) have done, that ibogaine produces a severe anxiety state without actually causing true hallucinations. However, Sigg personally took a dose of 200 mg of ibogaine and described the effects (81):

"Subjectively, the most unpleasant symptoms were the anxiety, the extreme apprehension, and the *unheimliche Grundstimmung* associated with visual and bodily hallucinations. The visual hallucinations appeared only in the dark and consisted of blue disks dancing up and down the walls. Dysesthesia of the extremities, a feeling of light-weightedness, and hyperacusis were other symptoms noted. Autonomic signs, such as dryness of the mouth, increased perspiration, slight pupillary dilation, and increase in pulse rate, as well as extrapyramidal symptoms (fine tremors, slight ataxia, enhanced tendon reflexes and clonus) were also present and confirmed by Dr. Schneider.

The peak effect was reached about two hours after swallowing the drug; it subsided gradually, leaving as a residue complete insomnia. No undesirable after-effects, such as exhaustion or depression occurred. It is worth noting that, unlike ibogaine, mescaline, which I took some time ago, transferred me into a quite pleasant imaginary state."

Although this is the only published account of the effects of a large dose of ibogaine on a white man, it seems clear that the drug is a bona fide hallucinogen, likely to produce anxiety. The hallucinogenic dose is several times the normal stimulant dose, so that the user must endure intense and unpleasant central stimulation in order to experience the hallucinogenic effects.

These results agree well with observations of *Tabernanthe iboga* use by the natives of Gabon. The reader will do well to bear them in mind in the consideration of the social importance of the plant, discussed in the next section.

Ethnobotanical Aspects of *Tabernanthe iboga*

Tabernanthe iboga is used by African natives throughout its range, and it is even exported into neighboring areas. It is probably most popular in Gabon, the only area where it has been observed to be in cultivation. The roots of *T. iboga* are most widely employed as a stimulant and aphrodisiac, but in Gabon the plant is equally important as an hallucinogen.

Many writers have published glowing accounts of the stimulant properties of *Tabernanthe iboga*. For example, Steinmetz (84) claims that it allows the natives to sit awake and motionless for as long as two days while waiting for game. Brzezicki (54) states that, by eating the roots, the natives manage to double the length of their day's march and the weight of what they are carrying without noticing the extra effort required. Although both of these descriptions may reflect some local hyperbole, they are reasonably consistent with the pharmacological findings.

Dybowski and Landrin, who originally isolated ibogaine, also consulted with the natives and recounted their replies as follows (36): "When asked by us, they always

replied that the action of iboga was identical to that of alcohol, but without disturbing the thought processes." These researchers concluded this to mean that the plant was a simple stimulant. It seems, though, that the natives would have been more likely to compare the plant to the cola nuts (*Cola nitida*), with which they were familiar, rather than to alcohol, if they were seeking to describe a purely stimulating effect. On the basis of pharmacological evidence, it seems likely that even small amounts of iboga would produce marginal hallucinogenic effects, possibly a "dreamy" or "floating" sensation. This may explain why the natives chose to compare the effects to alcohol, rather than to the caffeine in cola nuts.

Iboga is greatly prized by the natives as an aphrodisiac. Indeed, Burckhardt (1) claims that it is "even more highly valued than yohimbine," a constituent of *Corynanthe yohimbe*, probably the most famous of African "aphrodisiacs." There is no pharmacological evidence that ibogaine directly stimulates sexual functions, but the increase in confidence and lack of fatigue produced by its stimulant properties may easily account for its reputation. It is also possible that its hallucinogenic effects contribute. In other parts of the world, plants with primarily hallucinogenic effects, such as *Cannabis sativa*, have been claimed to be aphrodisiacs.

The most interesting use of iboga, however, is as an hallucinogen. Probably the first report of such utilization is that of Guien (97), who describes an initiate in a fetishist cult: "Soon all his sinews stretch out in an extraordinary fashion. An epileptic madness seizes him, during which, unconscious, he mouths words, which, when heard by the initiated ones, have a prophetic meaning and prove that the fetish has entered him."

Although Guien's description came from the Congo, near Ayenie, the center of use of iboga as an hallucinogen is Gabon. There, it is employed in the initiation rites of secret societies, the most famous of which is the Bwiti (also spelled Bouiti or Buiti). The story of *Tabernanthe iboga* in the Bwiti cult is a fascinating one, showing how a seemingly unimportant plant can have far-reaching social effects.

The Bwiti cult originated probably either

among the Mitsogo or the Apindji in central Gabon, in the area where iboga is most abundant. The cult has spread throughout Gabon during this century, and it now extends from Spanish Guinea to the Congo. It is best observed in the center of its influence, among such tribes as the Apindji, where it was recently studied by Swiderski (101). His description is one of many (see especially 94, 100, and 103), but, since it is one of the best, it is partly reproduced here.

One is said to be initiated into the Bwiti when one has "seen Bwiti" or when one has "eaten the iboga." To eat the iboga plant is the only way to see the vision of Bwiti, according to the lore of the cult. On the day of the initiation, the candidates go to the "temple of the universe," accompanied by their fathers and maternal uncles at six o'clock in the morning. There they are given two shallow baskets, each about 8 inches in diam, filled with raspings of iboga root. The priest stands in front of the boys and says, "See this stuff at your feet which you must like even though it tastes as repugnant as heavy oil. If I give it to you, will you consume it?" The boys reply, "Give, and I will consume it gladly." The priest responds, "Take it then, but with the mouth, not the hands."

Under the surveillance of the priest, fathers, and uncles, the boys gulp down the bitter and vile-tasting raspings. Throughout the day, the boys continue to eat iboga roots, encouraged by their guardians. It is not until late in the day that the candidates have eaten enough iboga to be able to see Bwiti.

The candidates begin the evening ceremonies with a ritual dance which includes all the members of the Bwiti in the tribe. At the end of the dance, the boys go off to a specially prepared hut where they eat still more iboga. A vigorous and joyous dance follows, and then, towards nightfall, the *lomba*, the central part of the ceremony, begins. A sorcerer dances for two hours and invokes the ancestors of the members. Then everyone participates in a torchlight dance. Amid the flames of the torches and the beauty of the equatorial night, with the effects of the iboga coming to a peak, the candidates begin to enter a trance. Soon everyone is silent; only the melody of the

mongongo, a sacred harp, is heard. The candidates begin to murmur among themselves, for they are beginning to see Bwiti. The visions continue for several hours, followed by a sleep which may last for five to seven days.

There are many variations in this pattern. Sometimes, the initiate is sent into the forest for several days after eating the iboga (99). Sometimes the iboga is mixed with other plants, such as *Alchornea floribunda* (103, p. 203; 35, p. 160). Like iboga, this plant is also considered an aphrodisiac, especially among the Eshira, who use it frequently. It may well be an hallucinogen, too (103, p. 149), because it is used in almost precisely the same way in the initiation to another secret society, the Byeri, which is prevalent among the Fang and the Eshira. Some concoctions in Gabon may involve as many as ten plants. Many valuable drugs may await discovery in this area.

The sacred iboga appears at several other points in the life of the Bwiti. Sorcerers employ the iboga before demanding information from the spirits. The leaders of the cult eat iboga for an entire day before asking advice of the ancestors, topping it off with an infusion of the root bark, which is served in a manner similar to the Christian communion.

It is a striking fact that the Bwiti cult has been expanding rather than disappearing during the past 50 years, despite a great deal of missionary effort. It has become probably the greatest single force against Christianity in Gabon, backed by the proverb, "Iboga and baptism are not compatible." The cult has adopted many of the rituals of Christianity, sometimes deliberately parodying them, and woven them together with the old beliefs. In recent years, the cult has helped to unify all the tribes against the innovations of the West. Some have wondered where it could get such an appeal, but this is not hard to see when one considers its powerful rituals, its promises of actual visions of God under the influence of iboga, and compares them with the unexciting alternatives of Christianity. Iboga and baptism are indeed incompatible, and there is little question as to which would appeal more to an African tribesman. Perhaps the most striking account of this comes from Georges Balandrier's ac-

count of recent developments in Gabon (94):

"This new faith exerts an undesirable attraction in several districts. It creates outlets for intense energies and demands those extreme psychological experiences which the Negro likes periodically to undergo. It demands a complete transformation of self, a liberation from a standardized and difficult existence. It restores order and confidence where the forces of disorganization,—and hence of insecurity,—have flourished."

Here is Balandrier's description of an all-night ceremony in one of the largest temples of Southern Gabon:

"The priest and his assistants had made their preparations in a private place. They had shared a concoction made from the grated rind of a plant named *ibo'a* (*Tabernanthe iboga*), a hallucinogen and an aphrodisiac. Their interminable dancing would reinforce these effects and carry them all, so they said, to the frontiers of true understanding and to the sources of power. . . .

"Then the dancing began around each of the poles dominating the architecture of the temple, a series of jumps, stamps, leaps, and movements, which might be described as compulsive. The torsos of the men streamed with sweat and their muscles stood out under the play of the lights. From time to time one of them rushed over to a pail of water, drank great draughts, and then resumed his intoxicated motion. The congregation sang and accompanied the priest by dancing in place. The women shook their rattles, the only instruments which provided an occasional musical accompaniment. The rhythm accelerated. The group had become a single creature, tensed for an impossible victory. I felt profoundly foreign, separate, trapped by my human dignity, encumbered by a body which had lost even the memory of its glorious potentialities. I felt like a kind of cripple to whom no one could pay even the slightest attention. . . .

"What does our civilization offer that is capable of arousing a fervor of this kind, an involvement spelling adventure for the body as well as the mind? Our churches put inner life and moral principles ahead of that exaltation which leads to the threshold of unconsciousness. They seem cold, devoid of supernatural presence, ill-suited to impassioned communion. In the eyes of the vil-

lagers, the missionaries are so many 'wet blankets' in the celebration of the fulfillment of man and the glory of the gods."

In this way a little known jungle plant has helped to unify an entire people and to block successfully some of the influence of our own civilization. Unless there are profound changes in missionary policy or in the Bwiti cult, it will continue to have a great deal of social importance in Gabon.

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ECONOMIC BOTANY AND ETHNOBOTANY IN AL-ANDALUS (IBERIAN PENINSULA: TENTH–FIFTEENTH CENTURIES), AN UNKNOWN HERITAGE OF MANKIND¹

J. ESTEBAN HERNÁNDEZ BERMEJO, AND EXPIRACIÓN GARCÍA SÁNCHEZ

Hernández Bermejo, J. Esteban (*Jardín Botánico de Córdoba and Departamento de Ciencias y Recursos Agrícolas y Forestales, Universidad de Córdoba, Apdo. 3048 Córdoba, Spain*), and **Expiración García Sánchez** (*Escuela de Estudios Arabes, C.S.I.C., Cuesta del Chapiz, 22, Granada, Spain*). ECONOMIC BOTANY AND ETHNOBOTANY IN AL-ANDALUS (IBERIAN PENINSULA: TENTH–FIFTEENTH CENTURIES), AN UNKNOWN HERITAGE OF MANKIND. *Economic Botany* 52(1):15–26. 1998. *The Hispano-Arabic culture in the Iberian Middle Ages is a major chapter in the history of the use and knowledge of plants. The Andalusí agronomists, botanists and physicians assimilated their heritage of Iberian, Hispano-Roman, and Hispano-Visigothic cultures with North-African and Eastern influences. They developed a profound knowledge of the plant world and managed a high diversity of species. A part of this ethnobotanical and agronomic heritage was transmitted not only to the local cultures and generations that followed, but also to peoples on the other side of the Atlantic Ocean by the Spanish colonists in the New World. This paper presents a study of the principal works of the so-called Andalusí Agronomic School (10th–15th centuries) and their agronomist authors: Arib ben Said, Ibn Wafid, Ibn Hayyay, Abu l-Jayr, Ibn Bassal, al-Tignari, Ibn al-Awwam and Ibn Luyun. We also raise questions about Andalusí ethnobotany, the introduction of Oriental species in the Iberian Peninsula and the prospects for ethnobotanical research through the philological study of Hispano-Arabic writings.*

La Botánica Económica y la Etnobotánica en Al-Andalus (Península Ibérica, Siglos Diez-Quince: un Patrimonio Desconocido de Humanidad). *La cultura hispanoárabe que se desarrolla durante el Medioevo Ibérico incluye un capítulo destacado relativo al uso y conocimiento de las plantas. Los agrónomos, botánicos y médicos andalusíes asimilan el patrimonio de sus culturas predecesoras (ibérica, hispanorromana, hispanovisigoda) y junto a las influencias orientales y norteafricanas de su época, alcanzan un gran conocimiento del mundo vegetal manejando una elevada diversidad de especies. Una parte de este patrimonio etnobotánico y agronómico será transmitido más allá de su ámbito temporal y geográfico, alcanzando incluso el otro lado del Atlántico, a través de los colonos españoles en el Nuevo Mundo. Este trabajo nos introduce en el estudio de los principales autores y obras de la llamada Escuela Agronómica Andalusí (siglos 10–15). Entre los agrónomos estudiados se encuentran, Arib ben Said, Ibn Wafid, Ibn Hayyay, Abu l-Jayr, Ibn Bassal, al-Tignari, Ibn al-Awwam e Ibn Luyun. Se plantean algunas cuestiones sobre la existencia de una etnobotánica andalusí, sobre la introducción de especies orientales en la Península Ibérica, y sobre las perspectivas de la investigación etnobotánica a través del estudio filológico de las obras y autores hispanoárabes.*

Key Words: al-Andalus; Andalusí agronomic school.

The crucial role played by the Iberian Peninsula in the introduction and exchange of species between the European and American continents is an unquestionable fact that has been object of numerous works and will still be a major subject for future research. The years immediately prior to 1992 were especially significant for conducting investigations on the exchange of species

and cultures between American and European peoples. Most contributions have analyzed the impressions of the first Spanish explorers, colonists, farmers, chroniclers, physicians and naturalists after their arrival in America and the species transported by them (Crosby 1991; Dawson 1960; del Río Moreno 1991; Estrella 1986; Watson 1983). In contrast, we could point to the depth of knowledge of the transport of American species into Europe from eighteenth century onward (García Paris 1991) and what took place

¹ Received 16 April 1996; accepted 25 July 1997.

in this regard in the sixteenth and seventeenth centuries (Hernández Bermejo and Lora González 1994; Hernández Bermejo and León, eds. 1995; Lora González 1994).

The role and influence of Spain in the transport of species from the Old World and the transfer of its traditional techniques, habits, and culture, cannot be understood without knowledge of the origin and history of the Mediterranean, European, and Iberian cultures and species. These, together with other Asian and African influences, took form over several millennia and gave rise to the agriculturally based cultures and landscapes and to the diversity of useful plant species that define the ethnobotanical and agricultural framework of Spain in the fifteenth century.

Over 135 million years, the Iberian Peninsula has been linked intermittently two major land masses before the appearance of humans. Later during the Meso- and Neolithic Ages, it was a gateway between North Africa and the southern Europe as well as the terminus of the long transport processes from the East to the West along the Mediterranean coasts and islands. During the millennium prior to the Christianity, the Phoenician, Greek, Carthaginian and Roman colonizations took place north of the Iberian Peninsula. After the first century, the Roman Empire promoted trade from Asia Minor, Africa and the Mediterranean basin. After the fall of the Roman Empire in the fourth century, the Visigothic Kingdom was established in the Iberian Peninsula and was influenced by the Byzantine Empire, especially during the sixth and seventh centuries. With this flow of empire over the centuries came the transfer from the East to West of crop, medicinal and aromatic plants.

In order to understand the legacy transmitted by the Iberian cultures and peoples to America it is important to begin in the eighth century and to focus on the tenth century and later. We are referring to the Hispano-Arabic Period, known by the historians as the Andalusi Period. It is convenient to clarify that al-Andalus was not only the southern region that it is known today as Andalusia, but the whole of the Iberian territory under Moslem domination. This historical period begins with the invasion of Tarik and the defeat of the Visigothic King Rodrigo in the battle of the Lake of La Janda in the year 711 and ends with the conquest of Granada by the Catholic Monarchs in 1492. From a cultural view-

point, however, the roots and culmination of this period are not so precise and, in any case, its splendor does not take such a long time to develop. Therefore from our point of view, we consider the Andalusian Period to cover the tenth to fifteenth centuries.

From an ethnobotanical point of view, the consequences of this period can be observed through very different contributions: species of agricultural interest introduced from Asia to Africa, other plants previously known but now grown as main crops, new agricultural techniques (Glick 1988), management and knowledge of countless medicinal plants and promotion of the scientific disciplines such as natural history, botany, pharmacology and medicine. The results were contained in many works and treatises, some of which have survived to our time. Moreover this knowledge has been transmitted since then through oral tradition. The so-called Reconquest of the Christian Kingdom interrupted the formal transmission of this heritage, by destroying documents and "forgetting" authors. But it would not eliminate the local culture that would conserve techniques, habits and plant varieties through generations. Much of this knowledge was carried to the American continent by the first Spanish explorers, colonists, and farmers. The rescue of this Andalusi ethnobotanical heritage is of great interest in order to recover neglected species and forgotten knowledge. And it can also be used in economic botany and ethnobotanical studies in America as a documentary source for understanding the origin and nature of a great part of the Old World's contributions to the New World.

We must recognize the existence of certain deficiencies in this source of information. Most of the original manuscripts were lost and ill-treated from the fifteenth century to the Enlightenment (eighteenth century). The documents were written originally in Arabic but only in a few cases were translated into other languages. Furthermore, there was poor communication between the fields of philology and arabism and those of botany, agronomy, pharmacology and ethnobotany. Our paper attempts to overcome this problem. Finally the difficulties for the translation and identification of the texts are noteworthy, especially as regards the agricultural species and terms used (Issa 1926). We have pointed out these problems and outlined the multidisciplinary method to solve them (Hernán-

dez Bermejo 1987; 1991). Some Arabists have confused Asian crops introduced into Europe with American species (for example, *Musa paradisiaca* with *Opuntia ficus indica*, or *Aloe vera* with *Agave americana*). More mistakes appear when the original translation from Arabic into Latin, or a modern language, is translated again into another modern language. These preliminary misidentifications have led scholars to underestimate the possibilities of the scientific analysis of these texts.

BIODIVERSITY AND IBERIAN ETHNOBOTANICAL HERITAGE BEFORE THE ANDALUSI PERIOD

The biodiversity of the economic flora of the Iberian Peninsula began with the autochthonous species:

FOREST TREES OF EDIBLE FRUIT

Several species of the Mediterranean forest were used because of their fruits and a domestication process was initiated (still not finished today). Species of the genus *Quercus* must be pointed out (evergreen oak *Q. ilex*, cork oak, *Q. suber*, gall oak *Q. faginea*). Others, in a wild state in certain regions of the Iberian Peninsula could have been subject to very ancient transport, as it is the case of *Corylus avellana* (hazelnut), *Castanea sativa* (chestnut) and *Pinus pinea* (pine).

FRUIT TREES

There were many different tree species of the Rosaceae family with edible fruits as *Crataegus monogyna* (hawthorn), *Pyrus* spp. (wild pear), *Sorbus aucuparia*, *S. aria* (rowan), *Prunus* spp. (*P. avium*, *P. mahaleb*, *P. spinosa*). Other edible fruits were those of *Myrtus communis* and *Arbutus unedo*, as well as those of southern species that could be easily introduced into the southern Iberian Peninsula: *Prunus avium* (sweet cherry) and *Malus domestica* (apple).

CEREALS

Some wild species of *Hordeum* (barley) and *Avena* (oat) were originally used.

LEGUMES

Different species of the genera *Lathyrus* (vetchlings), *Vicia* (vetches) and *Lupinus* (wild lupines).

VEGETABLES

Several species of Apiaceae, Asteraceae, Boraginaceae, Chenopodiaceae, Cruciferae and Liaceae could be used as wild or cultivated vegetables because of their leaf, fruit or root. For example, *Apium* (celery), *Daucus* (carrot), *Anchusa* and *Symphitum* (bugloss), *Lactuca* (wild lettuce), *Cichorium* (chicory), *Chenopodium* (goose-foot), *Rumex* (dock), several cardoons such as *Scolymus* spp. *Silybum marianum* and even *Cynara cardunculus*. Also *Asparagus* spp. (asparagus), *Beta vulgaris* (beets), *Silene* spp. (campion), *Diploaxis* spp. and *Brassica* spp., *Raphanus sativus* (radish), *Lepidium* spp. (peppergrass), *Nasturtium* spp. (watercress), *Atriplex* spp. (orach) and *Allium* spp. (wild garlic and onions). Other sources of carbohydrates: Flours were obtained from the seeds of plants such as *Polygonum* spp. and *Chenopodium* spp. or from fern roots (*Pteridium aquilinum*).

SPICES, AROMATIC SPECIES

The first Iberian settlers and farmers found a very diverse flora in spices such as: *Capparis* spp. (caper bush), *Laurus nobilis* (laurel), *Sinapis* spp. and *Brassica nigra* (mustard), *Foeniculum vulgare* (fennel), *Ruta graveolens* (rue), several Lamiaceae as *Rosmarinus officinalis* (rosemary) and *Origanum vulgare* (marjoram), and many species of other genera such as *Mentha* (mint), *Satureja* (savory), *Thymus* (thyme) and *Lavandula* spp. (lavender).

Joining the autochthonous species, economic plants from Central Europe, the Balkan and Italian Peninsulas, Africa, Asia Minor and even from Eastern Asia had arrived over several millennia in the western Mediterranean basin prior to the Arabic period. The chronology of this gradual enrichment can be established through the works of naturalists, physicians, agronomists and some Greek and Roman writers (Estrabo, Pliny, Dioscorides, Virgil) and even better through some Hispano-Roman and Hispano-Visigothic authors (Columella, Isidorus of Seville). This allochthonous component in the Iberian Peninsula added over the Neolithic to the Spanish-Roman Period includes:

FRUIT TREES AND FOREST SPECIES OF EDIBLE FRUITS

Olea europaea (olive) and *Vitis vinifera* (grape), perhaps completely allochthonous from the eastern Mediterranean, became the main

woody crops of the Iberian Peninsula. Other allochthonous species, such as *Ceratonia siliqua* (carob), *Celtis australis* (hackberry), *Ficus carica* (fig) and *Juglans regia* (walnut) acquired a wide distribution, and even became feral. The use of species such as *Pinus pinea* (pine) and *Castanea sativa* (chestnut) was consolidated and intensified. Other species introduced were *Pyrus communis* (pear), different oriental species of *Prunus* like *P. domestica* (plum), *P. armeniaca* (apricot), *P. persica* (peach) and *P. dulcis* (almond), *Phoenix datylifera* (date palm), *Cydonia oblonga* (quince), *Mespilus germanica* (medlar), *Ziziphus lotus* (jujube) and *Punica granatum* (pomegranate).

CEREALS

Wheat (*Triticum* spp.), barley (*Hordeum vulgare*) and rye (*Secale cereale*) together with sorghum, millets and broomcorn (*Sorghum vulgare*, *Panicum miliaceum*, *Setaria* spp.) became the main source of carbohydrates.

LEGUMES

Important legumes had already arrived from Western Asia such as: *Cicer arietinum* (chick pea), *Vicia faba* (broad bean), *Lens culinaris* (lentil), *Pisum sativum* (pea) and *Vigna sinensis* (cowpea), as well as other species of *Lathyrus* and *Vicia*.

VEGETABLES

Species such as *Brassica napus* (rape), *B. oleracea* (cabbage, kale), *Lactuca sativa* (lettuce), *Apium graveolens* (celery), *Smyrniolum olusatrum* (alexanders), *Allium cepa* (onion), *A. sativum* (garlic), *Lagenaria siceraria* (bottle-gourd) were cultivated.

SPICES, AROMATIC SPECIES

The rich autochthonous component was also enriched by other Oriental and European species such as *Coriandrum sativum* (coriander), *Petroselinum crispum* (parsley), *Carum carvi* (caraway), *Cominum cuminum* (cumin), *Pimpinella anisum* (anise), *Carthamus tinctorius* (safflower) and *Anethum graveolens* (dill, anethum).

This catalogue of indigenous and introduced useful species of Visigothic Hispania prior to Arabic colonization was lengthy and diverse.

THE ANDALUSI AGRONOMIC SCHOOL: ORIGIN, INFLUENCES, PRINCIPAL AUTHORS, EVOLUTION

Agriculture in the Iberian Peninsula reached a somewhat productive level before its splendid achievements during the Roman colonization. Afterwards it entered into a phase of stagnation and even regression during the Visigothic period.

A new and deeper agricultural development in the Iberian Peninsula began with the arrival of the Arabs in the eighth century the Andalusí scientists started to make original contributions in the tenth century. In addition to the new tendency to become independent from the eastern culture and science, a series of elements and circumstances converged in al-Andalus that would be the embryo of the so-called "Andalusí Agronomic School" It would reach zenith in the eleventh and twelfth centuries (García Sánchez 1992). The principal agronomist-writers of the Andalusí Agronomic School were:

TENTH CENTURY

- Arib ben Said: Historian, agronomist, physician and veterinarian from Cordova. *Calendario Agrícola* (translation by Pellat 1961)
Andalusí anonymous: Unknown author from Cordova. *Tratado Andalusí de Agricultura* (translation by López López 1990)

ELEVENTH CENTURY

- Ibn Wafid: Physician and agronomist from Toledo. *Compendio de Agricultura* (translation by Millas Vallicrosa 1943)
Ibn Hayyay: From Seville. *Lo que basta saber sobre Agricultura* (translation by Carabaza 1988; 1994; interpreted by Bolens 1981) *Plantas en al-Andalus en el siglo XI* (Carabaza 1994)
Ibn Bassal: Agronomist from Toledo. *Tratado de Agricultura* (translation by Millas Vallicrosa and Aziman 1955. Interpreted by García Sánchez and Hernández Bermejo, 1995)
Abu al-Jayr: From Seville. *Tratado de Agricultura* (translation by Carabaza 1994)
al-Tignari: From Granada. *Esplendor del jardín y recreo de las mentes* (translation and interpretation by García Sánchez 1987, 1988)

TWELFTH CENTURY

- Ibn al-Awwam: Agronomist from Seville. (Abu Zacarías) *Tratado de Agricultura* (translation

by Banqueri 1802; interpretation by Hernández Bermejo and García Sánchez 1988)

FOURTEENTH CENTURY

Ibn Luyun: From Granada. *Tratado de Agricultura* (translation by Eguaras 1975)

The Andalusí Agronomic School took the first steps in Cordova during the Caliphate Period within the group of physicians, chemists and botanists associated with the monarchs Abd al-Rahman III (912–961) and his son al-Hakam II (961–976). One of most influential factors for the development of pharmacology and botany and, consequently, of agronomy was Dioscorides' *Materia Medica* (Dietrich 1988), a copy of which the Byzantine Emperor Constantino VII Porfirogeneta sent to the Cordovan Caliph Abd al-Rahman III.

Nevertheless the most decisive event for the appearance of the Andalusí Agronomic School was the edition of the *Calendario de Córdoba* by Arib ben Said. This work of the tenth century is of vital importance for the study of botany and agriculture in Spain during the Moslem domination (Dozy ed. 1961). Many of the plant species introduced by the Arabs into the Iberian Peninsula are documented in this work for the first time. Also mentioned is the cultivation of many other species that were already acclimatized in the territory and whose use and cultivation were encouraged by them.

There is another text of the end of the tenth century, *Tratado Andalusí de Agricultura* (anonymous), that is probably the first written agronomic treatise in al-Andalus (López López 1990).

The climax of this agronomic school that led to the "Andalusí agricultural revolution" took place in a very specific historical moment: the decentralization period instituted by the Moorish Kingdoms after the breaking up of the Caliphate of Cordova (eleventh century). Moreover other factors were added: 1) A comprehensive translation program of documents on the Greek-Roman, Byzantine and mainly Mesopotamian agronomic heritage (eighth-tenth centuries) carried out in the Moslem East; 2) The advances in medical, pharmacological and botanical studies initiated in Cordova in ninth-tenth centuries; and 3) The urban development that, when facing the problem of food supply in the Hispano-Arab cities, spontaneously encouraged research pro-

jects towards the promotion and improvement of the agricultural sector (Lagardère 1993). In addition, the new Arabic settlers took advantage of the richness of the Iberian soil and of the important Hispano-Roman agricultural tradition (El-Faiz 1996).

In the eleventh century, the "School" founded in Cordova was transferred first to Toledo and then to Seville, and a close relationship with Granada was maintained. Despite the subsequent cultural and political decline, the *Poema Agrícola* by Ibn Luyun was written in the second half of the fourteenth century.

Few biographical data of these authors are known. This condition, together with the miscellaneous and summarized state of the Andalusí agricultural manuscripts, has made it quite difficult to study their works (Ullmann 1972). We have only limited information of those who were well known in other scientific fields. For example Ibn Wafid was a physician and chemist from Toledo and whose teachings were followed by another Andalusí agronomist, Ibn Bassal.

Ibn Bassal stands out above all the Andalusí authors for his personality. His knowledge was mainly based on his personal experience. After the reconquest of the Moorish Kingdom of Toledo by the Christians (1085), Ibn Bassal (like the rest of the intellectuals of the city) moved to Seville which then became the headquarters of the "school."

Abu al-Jayr, from Seville, appears by that time. Little is known about his theoretical-practical work, except some indirect information through other authors. Perhaps the best representative of the theoretical approach is Ibn Hayyay, about whom no biographical data are available. In contrast to his contemporary Ibn Bassal (1073), he compiled an impressive mosaic of quotations from previous authors, some of which are compared with his own experience. Studies of his work (Bolens 1981) show the influence of the Latin agronomic tradition, especially of Columella. This interpretation is considered suggestive but remains controversial.

Al-Tignari was the last author of the eleventh century, although his work came out in the first decade of the twelfth century. He was born on a farm near Granada. He was a physician, as well as a good writer and an excellent poet. After having travelled through North Africa and the Near East, he went back to al-Andalus, and lived in Granada and Seville. In Seville he

joined the group of agronomists and botanists associated with Ibn Bassal. Only half of his original manuscript is preserved but his work, in which theory and experience in fields like medicine, botany and linguistics are united, is one of the most ordered and systematic of the Andalusi agronomic treatises.

The encyclopedia on rural economy by Ibn al-Awwam came to light one century later. It was the only reference for Spanish-Moslem agronomy available for a long time and, paradoxically, little is known about the author except that he lived in Seville in the twelfth-thirteenth centuries. One of the merits of his agricultural treatise is that it includes an enormous number of citations from Andalusi and oriental texts. Therefore, besides being a compilation of the previous agronomic theories, it can help to identify some original texts (mainly by Spanish-Moslem authors) which are not known in their complete form. This book is one of the few intact works and presents all the zootechnic and agricultural knowledge of that time. It contains traditional information as well as that obtained through his own experience.

The last known work of the Andalusi agriculture is a didactic poem by Ibn Luyun (1349) from Almeria. It contains agricultural information, mainly obtained from the treatises by Ibn Bassal and al-Tignari. It is one of the few agricultural works that, along with the one by Ibn al-Awwam, is complete, which is unusual for Andalusi agronomic literature (Hernández Bermejo and García Sánchez 1988).

All of these authors acquired their knowledge from different sources: the first and most important source was the Greek-Byzantine eastern tradition; second, the Latin tradition, that undoubtedly existed, although the details of its transmission is not so well known as that of the Greek; and finally the assimilation of autochthonous knowledge comprising the Latin-Mozarabic heritage. In addition to these sources we must consider the knowledge gathered and transmitted in the *Agricultura Nabatea*, the first great Arabic work on agriculture, which represented the Mesopotamian tradition at the beginning of the tenth century.

EVALUATION OF THE ANDALUSI ETHNOBOTANICAL HERITAGE: THE AGRICULTURAL TREATISES

The Andalusi treatises, especially the complete ones, follow the pattern of those of the

classic Roman and Greeks, and Eastern cultures. Initial chapters focus on lands, waters, fertilizers, followed by plant crop issues and finish with zootechnology and veterinary practices. Agricultural calendars are usually included in these treatises along with astronomical and meteorological calendars and references to magic, local traditions, and experiences of the farmers. They conclude with practices of farm management, control of crop pests and diseases, and recommendations on the physical and moral factors to be considered when selecting the workers and persons in charge of the farm operation.

Some of these treatises, such as the *Libro de Agricultura* by Ibn Bassal, are eminently practical. They were written by agricultural technicians and were of great utility for the farmers of that time. The original and very interesting *Agricultural Calendar* by Arib ben Said describes not only the landscape but also the Mediterranean agricultural cycle of one thousand years ago. Other encyclopedic works cite authors, describe different experiences, and lead to rigorous scientific conclusions. An outstanding work of this type is the book by Ibn al Awwam.

The interest of some of these treatises in topics that today are characteristic of the concern for sustainable or ecological agriculture is noteworthy. It is remarkable to encounter, for example, the obsession for recycling nutrients, the appropriate use of manure, the preventive aspects of pest and disease management, the control techniques based on natural repellents, and treatments (that today are considered as phytohormonal) to facilitate vegetative propagation and rooting.

Another valuable insight gained when interpreting the agricultural structure and landscape described in these works is that they reflect the management of a very high biological diversity. The number of species mentioned in almost all these treatises is not only greater than that of previous cultures, but it is also greater than that of other contemporary and subsequent agricultural systems and surveys (Herrera 1513) of the surrounding Christian Kingdoms. Agriculture in the Christian Kingdoms was organized to provide a diet based on the trilogy of meat-wheat-wine and was a less varied and drier agriculture. In contrast with this system, the water management in irrigated lands, the establishment of orchards in valleys and on river banks and the cultivation of dry land, tree crops (almonds, carobs,

oaks, figs, jujubes, pistachios and wine grapes) made the Hispano-Arabic agriculture and way of living and food much more complex. Diversity of the agricultural landscape was accompanied by the knowledge and management of a large number of cultivars. Some authors describe in detail their morphological differences and uses.

Part of this diversity includes crops that have been lost or neglected in modern agriculture, such as *Silybum marianum*, *Cichorium intybus*, *Eruca sativa* and *Smyrnum olosatrum*. Some others disappeared in the Iberian agriculture but are still cultivated in other regions of the world, *Zizyphus lotus*, *Pistacia vera*, *Portulaca oleracea*, *Vigna sinensis*. Finally some are nearly extinct in our region of reference but were introduced into America, such as *Cichorium intybus*, *Vigna sinensis*, *Coriandrum sativum* and *Lathyrus vulgaris*.

An example of this type is the work by Ibn Bassal from Toledo. He is far from being a very exhaustive author and his work is one of the less extensive ones because it focused on practical matters rather than theoretical aspects. According to our recent review and analysis (Table 1), the species cited by this author could represent the basic agricultural flora in the eleventh century. Nevertheless, we should be aware that this catalogue is not a complete work, but only a summary. The lack of significant information concerning cereals and other dry-land crops in this work may only be the result of the incompleteness of what is available to us.

Another aspect of great interest is the gradual arrival of Oriental species. It is possible to recreate one of the most interesting chapters of the dispersion process of agricultural species by specifying the chronology of their introduction, the effective establishment of their cultivation and the evolution of their different uses and varieties. We have already dealt with these subjects by comparing the incremental references to Asian and African species by Spanish-Roman, Spanish-Visigothic authors and by the principal Andalusí agronomists in the tenth to fourteenth centuries (Hernández Bermejo 1991). Table 2 shows some of the species introduced during this period.

At this stage of our study we find it advisable to make only a preliminary interpretation of these lists. In addition to the methodological difficulties aforementioned, there are also some

doubts concerning whether the species were only known and consumed or were also cultivated. For instance, some of the plants whose introduction into the Iberian Peninsula has been traditionally attributed to the Arabs, were already cited by Isidorus of Seville in the seventh century (ed. 1982). This is the case of the sugar cane (*Saccharum officinarum*), citron tree (*Citrus medica*), mulberry (*Morus* spp.), saffron (*Crocus sativus*), some species of cotton (*Gossypium* spp.), pepper (*Piper nigrum*), ginger (*Zingiber officinale*) and many species of cinnamon and camphor (*Cinnamomum* spp.).

These doubts still remain among the Hispano-Arabic authors. Probably some of the species mentioned by them were never cultivated in the Western Mediterranean because of their tropical character. This may be the case of pepper (*Piper nigrum*), indigo (*Indigofera indica*), cinnamon (*Cinnamomum zeylanicum*), or snowbell (*Styrax officinale*). Others, such as henna (*Lawsonia inermis*) or tree cotton (*Gossypium arboreum*) not present in contemporary Iberian agriculture, were established crops in that time. Other species were common crops that have been neglected or even totally forgotten today e.g., *Pistacia vera*, *Zizyphus lotus*, *Vigna sinensis*, *Linum usitatissimum*, *Cannabis sativa*, *Lepidium sativum*, *Eruca sativa*, *Portulaca oleracea*, *Cichorium intybus*, *Silybum marianum*, *Myrtus communis* and *Urginea maritima*. A comprehensive research program on this subject would surely lead to the recovery of certain crops.

ANDALUSI ETHNOBOTANY

THE ORAL TRADITION

In the written records of Andalus there are many evidences of the importance of direct experience and of the oral transmission of knowledge. Thus, Ibn al-Awwam (Banqueri 1802, re-edited 1888), the Andalusí agronomist who compiled the greatest number of bibliographical sources, after mentioning them, ends by saying: "No sentence is expressed in my Work that I have not previously experienced many times." In other paragraphs we can find phrases such as: "It is said (by the farmers) that it is convenient . . ." On the other hand, authors like Ibn Bassal based their teachings on their own experience or on their contemporaries experience as farmers.

If an ethnobotanical tradition is understood to emphasize the oral transmission of plant knowl-

TABLE 1. SPECIES IDENTIFIED IN THE *LIBRO DE AGRICULTURA* BY IBN BASSAL IN THE ELEVENTH CENTURY (FROM GARCÍA SÁNCHEZ AND HERNÁNDEZ BERMEJO 1995).

<i>Acacia abysinica</i> Benth., babul acacia
<i>Adenocarpus</i> spp.
<i>Adiantum capillus-veneris</i> L., maiden hair fern
<i>Alcea rosea</i> L., holly hock
<i>Allium cepa</i> L., onion
<i>Allium porrum</i> L., leek
<i>Allium sativum</i> L., garlic
<i>Althaea cannabina</i> L., mallow
<i>Althaea officinalis</i> L., marsh mallow
<i>Amaranthus blitum</i> L., amaranth
<i>Amaranthus graecizans</i> L., amaranth
<i>Anchusa azurea</i> Miller, bugloss
<i>Anthemis</i> sp., chamomile
<i>Arbutus unedo</i> L., strawberry tree
<i>Artemisia absinthium</i> L., wormwood
<i>Asparagus acutifolius</i> L., (wild) asparagus
<i>Asparagus albus</i> L., asparagus
<i>Asparagus officinalis</i> L., common asparagus
<i>Atriplex hortensis</i> L., orach
<i>Balsamodendron</i> spp., balsam tree
<i>Beta vulgaris</i> L. var. <i>cicla</i> L., beet
<i>Boswellia</i> sp., incense tree, frankincense
<i>Brassica napus</i> L., rape
<i>Brassica nigra</i> (L.) Koch, black mustard
<i>Brassica oleracea</i> var. <i>acephala</i> , DC., kale
<i>Brassica oleracea</i> var. <i>botrytis</i> , broccoli
<i>Brassica oleracea</i> L. var. <i>capitata</i> L., cabbage
<i>Calystegia sepium</i> (L.) R.Br., bindweed
<i>Capparis ovata</i> L., bush
<i>Capparis spinosa</i> L., caper bush
<i>Carthamus</i> sp. (<i>C. arborescens</i> ?, <i>C. lanatus</i> ?), safflower
<i>Carthamus tinctorius</i> L., safflower
<i>Carum carvi</i> L., caraway
<i>Cassia fistula</i> L., golden-shower
<i>Castanea sativa</i> Miller, chestnut
<i>Celtis australis</i> L., hackberry
<i>Ceratonia siliqua</i> L., carob tree
<i>Chamaemelum</i> sp., chamomile
<i>Chamomilla recutita</i> (L.) Ranschert, chamomile
<i>Chelidonium majus</i> L., celandine
<i>Cicer arietinum</i> L., chick pea
<i>Cichorium intybus</i> L., common chicory
<i>Citrullus colocynthis</i> (L.) Schrader, bitter apple, colocynth
<i>Citrullus vulgaris</i> Schrader, water melon
<i>Citrus aurantium</i> L., orange
<i>Citrus limon</i> (L.) Burm. fil., lemon
<i>Citrus medica</i> L., citron
<i>Commiphora abyssinica</i> (Berg.) Engl., myrrh
<i>Convolvulus arvensis</i> L., field bindweed
<i>Convolvulus althaeoides</i> L., bindweed

TABLE 1. CONTINUED.

<i>Convolvulus tricolor</i> L., dwarf morning-glory
<i>Coriandrum sativum</i> L., coriander
<i>Corylus avellana</i> L., hazelnut
<i>Crocus sativus</i> L., saffron
<i>Cuminum cyminum</i> L., cumin
<i>Cucumis flexuosus</i> L., snake melon
<i>Cucumis melo</i> L., melon
<i>Cucumis sativus</i> L., cucumber
<i>Cupressus sempervirens</i> L., cypress
<i>Cydonia oblonga</i> Miller, common quince
<i>Cymbopogon schoenanthus</i> (L.) Spr., (oil) grass
<i>Cynara cardunculus</i> L., cardoon
<i>Cynara scolymus</i> L., artichoke
<i>Cyperus rotundus</i> L., coco grass, nut grass
<i>Cyperus esculentus</i> L., nut sedge
<i>Cytisus</i> spp., dyer's broom
<i>Daucus carota</i> L., carrot
<i>Dipsacus fullonum</i> L., wild teasel
<i>Dolichos lablab</i> L., hyacinth bean
<i>Dolichos melanophthalmos</i> DC., asparagus bean
<i>Elaeagnus angustifolia</i> L., oleaster
<i>Erysimum cheiri</i> (L.) Crantz., wall-flower
<i>Ficus carica</i> L., fig tree
<i>Ficus sycomorus</i> L., sycamore
<i>Fraxinus angustifolia</i> Vahl., ash
<i>Fraxinus excelsior</i> L., European ash
<i>Fraxinus ornus</i> L., flowering ash
<i>Genista</i> spp., broom
<i>Gossypium arboreum</i> L., tree cotton
<i>Gossypium herbaceum</i> L., levant cotton
<i>Hordeum vulgare</i> L., barley
<i>Hyphaene thebiaca</i> Mart., gingerbread palm
<i>Jasminum officinale</i> L., jasmine
<i>Juglans regia</i> L., walnut
<i>Juncus</i> sp., rush
<i>Lactuca sativa</i> L., lettuce
<i>Lagenaria siceraria</i> (Mol.) Stand., bottle gourd
<i>Lathyrus</i> sp., wild peas
<i>Laurus nobilis</i> L., laurel
<i>Lawsonia inermis</i> L., henna
<i>Lens culinaris</i> Medic., lentil
<i>Lepidium</i> sp., pepper grass
<i>Ligustrum vulgare</i> L., common privet
<i>Lilium candidum</i> L., madonna lily
<i>Linus usitatissimum</i> L., flax
<i>Lupinus albus</i> L., white lupine
<i>Lycium</i> spp., box thorn
<i>Lygeum spartum</i> L., feather grass, rush
<i>Malus domestica</i> Borkh., common apple
<i>Matricaria</i> sp., matricary
<i>Matthiola incana</i> (L.) R.Br., stock
<i>Melia acederach</i> L., paradise tree
<i>Melilotus officinalis</i> (L.) Pall., yellow sweet clover
<i>Melissa officinalis</i> L., common balm
<i>Mentha suaveolens</i> Ehrh., apple mint

TABLE 1. CONTINUED.

<i>Morus alba</i> L., white mulberry
<i>Morus nigra</i> L., black mulberry
<i>Myrtus communis</i> L., myrtle
<i>Narcissus</i> spp., daffodil
<i>Narcissus papyraceus</i> Ker-Gawler, daffodil
<i>Narcissus pseudonarcissus</i> L., daffodil
<i>Narcissus tazetta</i> L., daffodil
<i>Nasturtium vulgare</i> R. Brown., watercress
<i>Nerium oleander</i> L., oleander
<i>Nigella sativa</i> L., black cumin
<i>Ocimum basilicum</i> L., common basil
<i>Olea europaea</i> L., olive tree
<i>Onopordum</i> sp., thistle
<i>Origanum majorana</i> L., sweet marjoram
<i>Oryza sativa</i> L., rice
<i>Panicum</i> spp., panic grass
<i>Panicum miliaceum</i> L., broomcorn
<i>Papaver</i> sp. (probl. <i>P. rhoeas</i> L.), poppy
<i>Papaver somniferum</i> L., opium poppy
<i>Pastinaca sativa</i> L., parsnip
<i>Pennisetum</i> spp., millet
<i>Phoenix dactylifera</i> L., date palm
<i>Phragmites communis</i> Trin., reed
<i>Pimpinella anisum</i> L., common anise
<i>Pinus</i> spp., pine tree
<i>Piper nigrum</i> L., black pepper
<i>Pistacia terebinthus</i> L., cyprus-turpentine
<i>Pistacia vera</i> L., pistachio tree
<i>Pisum sativum</i> L., garden pea
<i>Populus alba</i> L., white poplar
<i>Populus nigra</i> L., black poplar
<i>Portulaca oleracea</i> L., purslane
<i>Prunus armeniaca</i> L., apricot tree
<i>Prunus avium</i> L., sweet cherry tree
<i>Prunus domestica</i> L., plum tree
<i>Prunus dulcis</i> (Miller) D.A. Webb, almond tree
<i>Prunus mahaleb</i> L., mahaleb
<i>Prunus persica</i> (L.) Batsch, peach tree
<i>Punica granatum</i> L., pomegranate tree
<i>Pyrus communis</i> L., pear tree
<i>Quercus rotundifolia</i> Lam., oak tree
<i>Raphanus sativus</i> L., radish
<i>Retama sphaerocarpa</i> (L.) Boiss., broom
<i>Rosa</i> spp., rose
<i>Rubia tinctorum</i> L., madder
<i>Rubus</i> spp., bramble
<i>Rumex</i> spp., dock
<i>Ruta</i> spp., rue
<i>Salix</i> spp., willow
<i>Salix alba</i> L., white willow
<i>Salix babylonica</i> L., weeping willow
<i>Salix purpurea</i> L., basket willow
<i>Scirpus holoschoenus</i> L., soft rush
<i>Sesamum indicum</i> L., sesame
<i>Setaria italica</i> (L.) Beauvois, foxtail millet

TABLE 1. CONTINUED.

<i>Sinapis alba</i> L., white mustard
<i>Solanum melongena</i> L., egg-plant, aubergine
<i>Sorghum bicolor</i> (L.) Moench, sorghum
<i>Spinacia oleracea</i> L., spinach
<i>Stipa tenacissima</i> L., esparto
<i>Styrax benzoin</i> Dryand., snowbell
<i>Styrax officinale</i> L., snowbell
<i>Terminalia</i> sp., myrobalan
<i>Thymus mastichina</i> (L.) L., thyme
<i>Triticum</i> spp., wheat
<i>Ulmus</i> spp., elm
<i>Ulmus minor</i> Miller, elm
<i>Urginea maritima</i> (L.) Baker, sea onion
<i>Verbascum</i> spp., mullein
<i>Vicia</i> sp., vetch
<i>Vicia ervilia</i> (L.) Willd., bitter vetch
<i>Vicia faba</i> L., broad bean
<i>Vigna unguiculata</i> (L.) Walpers., cowpea
<i>Viola tricolor</i> L., European wild pansy
<i>Vitis vinifera</i> L., wine grape
<i>Ziziphus lotus</i> (L.) Lam., jujube

TABLE 2. DATES OF FIRST REFERENCES TO SOME PRINCIPAL AGRICULTURAL SPECIES INTRODUCED INTO THE IBERIAN PENINSULA FROM SEVENTH TO FOURTEENTH CENTURIES.

Species	Century
<i>Cannabis sativa</i> L.	10 th
<i>Carthamus tinctorius</i> L.	11 th
<i>Citrus aurantiifolia</i> (Christm. et Panz.) Sw.	14 th
<i>Citrus aurantium</i> L.	11 th
<i>Citrus grandis</i> (L.) Osbeck	11 th
<i>Citrus limon</i> (L.) Burn. fil.	10 th
<i>Citrus medica</i> L.	7 th (before?)*
<i>Crocus sativus</i> L.	10 th (7 th)*
<i>Glycyrrhiza glabra</i> L.	7 th
<i>Gossypium arboreum</i> L.	13 th
<i>Gossypium herbaceum</i> L.	10 th
<i>Indigofera tinctoria</i> Lam.	11 th
<i>Lawsonia inermis</i> L.	10 th
<i>Musa</i> spp. L.	10 th (7 th ?)
<i>Oryza sativa</i> L.	10 th
<i>Saccharum officinarum</i> L.	10 th (7 th ?)
<i>Solanum melongena</i> L.	10 th
<i>Sorghum</i> spp.	11 th
<i>Spinacia oleracea</i> L.	11 th

* The question marks indicate a possible previous introduction (because they are mentioned by Isidorus of Seville in his Etymologies).

edge, then the writings of the Andalusí agronomists attest clearly to the existence of such a tradition. It is probable that a very significant component of the popular knowledge that was transmitted from Spain to America in the sixteenth and seventeenth centuries and that is still conserved on both continents mainly come from that ancient heritage gathered, processed and augmented during the history of al-Andalus.

PLANTS AND THE ANDALUSÍ COSMIC VISION

Did the Andalusí culture have tree species that played a role similar to these in the cosmic vision of many indigenous cultures? Did any sacred tree or species exist around which a cosmology for the Hispano-Arabic civilization could be established? Indeed it is risky to give specific answers, but we can remember that the date palm (*Phoenix dactylifera*) is the tree that best defines the Arabic civilization. The role of this species and especially its fruits as food for the nomadic and sedentary peoples from Western Africa to the Orient is reflected by the rich terminology conserved in the Arabic language: each morphological element of the palm is named by one or more terms. Each stage of the maturation and germination of dates has specific names (Löw 1967). This tree is frequently cited in the Koran as a gift of Providence to mankind because it also provides other highly valued resources for food, pottery and industry. Palm groves have always been centers of sedentism and civilization in the desert. The cover and shade of the palm create favorable conditions for the development of animal and plant life (Fillion 1884; Viré 1993).

Up to what point was this obsession and dependence taken to the territories of al-Andalus? Although the palm did not play the same significant role as in the deserts of Northern Africa and the Near East, its presence in poetry and in the Andalusí gardens has been an unquestionable fact since the Cordovan Caliphate in the tenth century.

Other trees also played a major role in the Hispano-Arabic landscape and culture: the autochthonous cork and evergreen oaks (*Quercus suber*, *Q. ilex*, *Q. rotundifolia*) dominated the countryside, fed men and cattle, marked the different seasons, heated ovens and hearths, and produced material for farming implements, tools and furnishings. The olive tree (*Olea europaea*), fig (*Ficus carica*), pomegranate (*Punica grana-*

tum), hackberry (*Celtis australis*) and mulberries (*Morus* spp.) provided food, handicrafts, habits and ways of living. In short, all these species were characteristic of the cultures and ecosystems at that time.

MEDICINAL PLANTS

One of the most influential accomplishments of the Andalusí Agronomic School was the translation from the Greek into Arabic of the *Treatise on Medical Issues* by Dioscorides in Cordova during the tenth century. Most of these agronomists were also physicians (Ibn Waffid, al-Tignari) and Dioscorides work became an essential instrument for them.

To a certain extent the Andalusí agricultural treatises were influenced by the humoral medical theory by Galen and Hippocrates which was applied to the classification of soils, water, fertilizers and plants. References to the properties of the species studied are frequent: the quince is considered to be antidepressive; lentil "fattens the blood," in relation to its high content of iron; oil from safflower seeds has medical applications (not specified); aphrodisiac properties can be found in turnip, wild leek and chamomile oil; the colocynth is used as a laxative; chestnuts have vermifuge properties, like chickpeas (which also facilitate menstruation) and the juice from the leaves of the apricot tree; the carob bean is a diuretic; the leaves and the skin of the lemon are used as antidotes against certain poisons, as is anise.

Not only the curative properties are mentioned by the agronomists. Some plants also prevent organic irregularities derived from the frequent ingestion of others (for example, sleep difficulties and visual problems caused by the broad bean). They even describe methods by which they introduce (generally through incisions) certain drugs into the plants in order to promote properties of the introduced substances in the treated plant.

Obviously, the dietetic and therapeutic qualities of the wild and cultivated species described by the Andalusí agronomists must be understood within the context of medieval medicine. Some concepts found in these references may be completely forgotten today. After careful and critical reading, we might discover the existence of current uses of previously unknown origin or rediscover certain applications that might be reintroduced today.

KNOWLEDGE AND MANAGEMENT OF WILD SPECIES

Despite the great interest in crops, the wild species are not forgotten, either for being exploited directly from their natural populations or for their properties and applications. Thus amongst the cultivated species, fruits of different species such as *Rhamnus* spp., *Rubus* spp., *Arbutus unedo*, *Myrtus communis*, *Crataegus monogyna*, *Sorbus* spp. are collected as well as the wood of *Salix* spp. and *Populus* spp.. Amongst the wild species, oleander (*Nerium oleander*) is used against nits, lice and other parasites on the hair; myrtle (*Myrtus communis*) is collected because of its application for cosmetics (to blacken and strengthen the hair); sea onion (*Urginea maritima*) is used against mice; cords are made from the leaves of the date palm; plants such as rocket (*Eruca sativa*), peppergrass (*Lepidium* sp.) or alexanders (*Smyrnum olosatrum*) have stimulant properties, etc. The catalogue is huge and still to be compiled.

CONCLUSIONS: PERSPECTIVES OF THE ETHNOBOTANICAL AND PHILOLOGICAL RESEARCH IN THE HISPANO-ARABIC AUTHORS

Much research is still needed concerning the agriculture of al-Andalus, the exploitation and conservation techniques, the cultivated species as well as those directly used from the wild, among other topics. This is not only a cultural heritage from the past, but also crucial information to understand the history and evolution of the human/plant relationship and to recover useful species and knowledge for mankind.

The interest in this subject has been renewed after having been ignored by historians and Arabists for a long time. As a consequence, a variety of projects has been initiated. The first phase (already in progress) is philological because these texts require rigorous revision and translation. The identification and interpretation of the names of the plants cited in the texts are especially difficult because, in addition to the strictly philological problems, inconsistencies and mistakes between scientific and common names may also appear. These concerns led to the formation in the late 1980s of a multidisciplinary team formed by Arabists, agronomists and botanists. This team continues to carry out a series of projects, integrated in the national

and regional research programs, that will lead to a better knowledge of the agriculture in al-Andalus.

Without any doubt, the Hispano-Arabic agriculture of the eleventh-thirteenth centuries was the most important of the Muslim world. It compiled the previous agricultural knowledge and introduced many innovations, leaving its mark on the agricultural practices of the Christian world. All that Hispano-Arabic agricultural tradition crossed the Atlantic Ocean and was introduced in the New World by the first European colonists, where it mixed with the indigenous knowledge and with other influences imported from other continents.

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An Archaeological and Historical Account of Cannabis in China

HUI-LIN LI¹

Although Cannabis is generally believed to be of Asiatic origin, within this vast geographical area, there is no general agreement as to where the domestication really came about. Alphonse de Candolle (1884), the first authority on the origin of cultivated plants, ascribed a very extensive range to the plant. He asserted that "the species has been found wild, beyond a doubt, to the south of the Caspian Sea, near the Irtysh, in the desert of Kirghiz, beyond Lake Baikal in Dahuria (government of Irkutsch). Authors mention it throughout southern and central Russia and to the south of the Caucasus, but its wild nature is here less certain, seeing that these are populous countries, and that the seeds of the hemp are easily diffused from gardens. The antiquity of the cultivation of hemp in China leads me to believe that its area extends further to the east, although this has not yet been proved by botanists."

Later workers, mostly working on field collections, either have accepted this very general and extensive area, or favor specific regions, such as the Himalayas, central Asia, India, Pakistan or China (Vavilov, 1926; Zhukovskii, 1962). It is a difficult problem to differentiate truly wild plants from spontaneous, escaped or semi-cultivated plants. There still remains much to be done to clarify the systematics of Cannabis. Moreover, in the case of Cannabis, which has been associated with man for so long, botanical studies alone are inadequate to ascertain the origin of cultivation. As one author states (Schultes, 1972), "It would seem that historical and ethnobotanical evidence

must have greater weight perhaps — at least at the present state of our understanding — than the study of collections of wild, cultivated or spontaneous specimens."

From a historical vantage, Cannabis has been found in China since Neolithic times, about 6,000 years ago, with a continuous record of cultivation down to the present. This record stands unique in comparison to those of other regions in Asia, and it strongly indicates the plant to be indigenous. New archeological finds in recent years considerably substantiate and extend its early history. The very scattered references in historical literature are in need of organization and analysis. These records are assembled here, followed by some notes on the possible routes of early diffusion of the plant in relation to its usage.

Cannabis, as a cultivated plant, had many uses in ancient times in China. It was primarily an important fiber plant, and the dominant textile plant in northern China until more recent times when other textile plants from warmer southern habitats became known and cotton was introduced from abroad. It was used extensively in making ropes and cordage, fish nets, fabrics of all kinds, and as raw material for making paper. As a food crop, the seed was one of the major grains of ancient China, the use of which gradually decreased until it was finally forgotten as a grain for human consumption. Oil extracted from the seed was used for frying food but had even more industrial applications. The fruits, leaves and roots were used in medicine in ancient times. The medicinal uses of the plant diminished in later ages. The plant was also used as a hallucinogenic drug.

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Fig. 1. Neolithic pottery jar from Pan-p'o, Si-an, decorated with weaving design.

ARCHEOLOGICAL RECORDS

In 1921, Andersson (1922) discovered the Neolithic culture remains at Yang-shao, Honan province. Among the pottery finds, some were decorated with clear impressions of cloth. Andersson believed that the material of this cloth was hemp. Fine bone needles were also found, indicating the existence of sewing at that time.

The Yang-shao culture, characterized

by painted pottery, is the oldest known Neolithic culture in China. It was subsequently discovered at many sites and most of these excavations reveal directly or indirectly the existence of plant fibers and textiles which are attributable to hemp. Paintings of rope and woven cloth designs were found on many pots, and impressions of ropes were found on others. At the Yang-shao site at Hua-hsien, Shensi province (Shensi Museum, 1959), were unearthed many pottery spinning-whorls

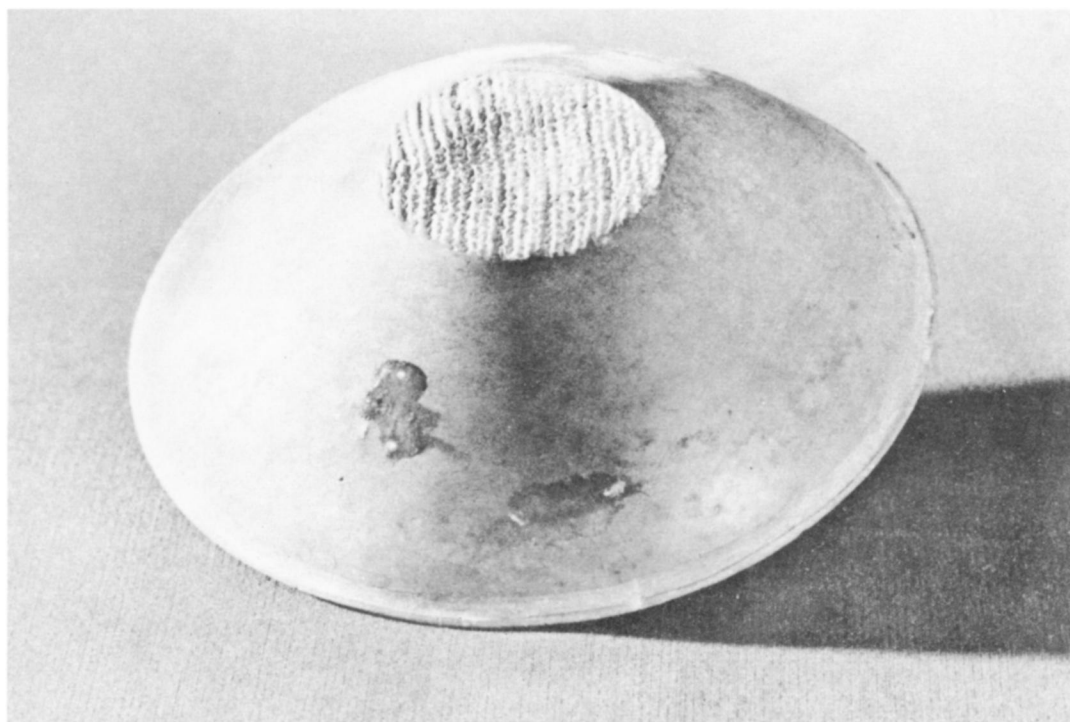


Fig. 2. Neolithic pottery bowl from Pan-p'o, Si-an, with imprints of hemp cloth.

of different types with different decorations, and numerous finely made bone needles with well-shaped holes. Distinct fragmentary impressions in the dirt in one grave, according to the discoverers, most probably were made by hemp cloth.

The most notable site of the early Neolithic Yang-shao culture is the recent discovery at Pan-p'o, near Sian, Shensi province (Si-an pan-p'o Museum, 1963). Among the artifacts from this village site are many tools for weaving and sewing, such as stone and pottery spinning-whorls and bone needles. Ropes and cloth are the commonest decorative designs on the potteries discovered there. The most distinct evidence of hemp are imprints of textiles found on some of the pottery pieces. (Figs. 1, 2, 3).

An analysis of the pollen deposits at Pan-p'o (Chou, 1963) reveals the presence, among many other plants, of a considerable amount of pollen attributed to *Humulus* sp., now a weed in northern China. This pollen may have actually represented *Cannabis*, since the pollens of

these two plants are almost indistinguishable in their structure. Many cultivated plants, including cereals and other crops, are represented in these pollen deposits.

Carbon-14 dating of carbonized remains from Pan-p'o (An, 1972) has now established the dates of Yang-shao remains as 4115 ± 110 B.C. to 3535 ± 105 B.C. The core of the Yang-shao culture was found (Chang, 1969) to extend from modern Shensi, Shansi, Honan to northern Hopei, thence extending north-eastward to the southern part of Liaoning in northeast China.

The Lung-shan culture, post-dating Yang-shao, was characterized by black pottery. Its early stage extended from the eastern coast westward along the Yellow and the Yangtze rivers to Honan and Hupeh provinces (Chang, 1969). Carbon-14 dating from various localities range from 2310 ± 95 B.C. to 1170 ± 90 B.C. (An, 1972). Among the relics of the later Neolithic stage, at a recently discovered site at Hsi-chou, Honan province (Honan Museum, 1972), there are pottery

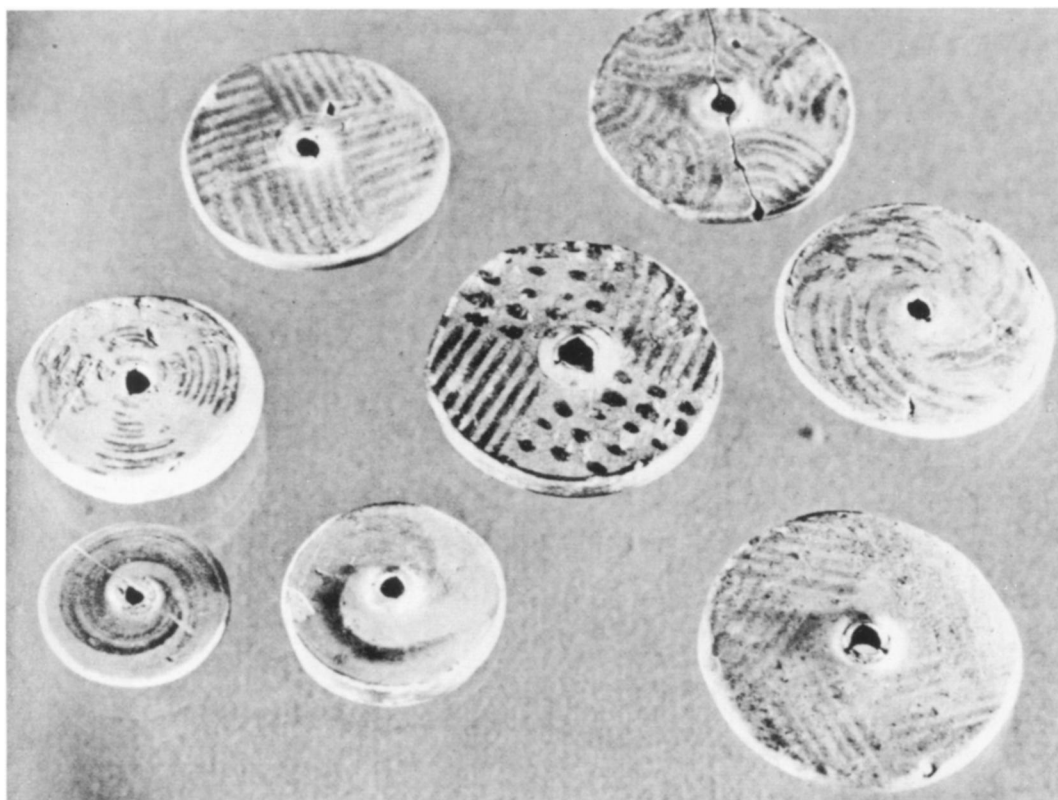


Fig. 3. Neolithic pottery spinning-whorls with different designs, from Pan-p'o, Si-an.

spinning-whorls and potteries with rope patterns; and from a subsequent stage, there are pottery spinning-whorls and bone needles.

The earliest historical period, the Yin or Shang dynasty (approximately 1766-1122 B.C.) is the age of bronze and pottery. Written script was found on oracle bones and shells excavated in modern times from Honan province. The character "hemp" has not been found among the deciphered ideograms of the oracle bones but those which have been identified represent only about one-third of all such characters on the oracle bones so far discovered. Culturally this period was especially famous for the many elaborate and exquisite bronzes. Stone implements, however, were still being used.

There is one archeological find of this period related to hemp. In 1931, Li (C. Li, 1931), reporting on excavations at Anyang, Honan province, mentioned that on

some of the *ku*-type bronze weapons buried in graves appeared very conspicuous cloth patterns. Although no statement was made as to the actual material of the cloth, hemp was the most likely source.

From the Chou dynasty, lasting from 1122-249 B.C., including the period of the "Spring and Autumn Annals" 722-481 B.C. and the Period of the Warring States 481-221 B.C., there are abundant literary records pertaining to the extensive use of Cannabis, both as textile and as grain. These accounts will be treated in the following section.

A rare archeological find is the recent discovery of a fragment of hemp cloth of the late Chou dynasty in Shansi province (Ko, 1972). The discovery was made in a grave containing bronze vessels and weapons, jade and potteries. The inscriptions on the bronze vessels prove the grave to be of the Western Chou dynasty. The weave

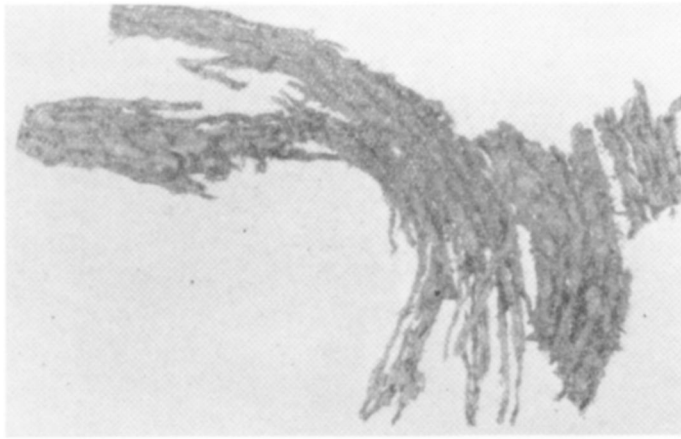


Fig. 4. Fragment of hemp cloth from late Chou dynasty found in Shansi province.

of the cloth was relatively tight, indicating that weaving techniques had by then reached a relatively high standard.

Another interesting find was made at the site containing several hundred pieces of "oath document," which are jade and stone slabs with red inscriptions, discovered recently in Shansi province (T'ao and Wang, 1972). These date from the Eastern Chou dynasty. In these texts, the archaic character *ma* (hemp) appears with the connotation of "negative," which was a secondary meaning attributable to the stupefying effect of the plant. This provides the indirect proof of the fact that this physiological effect of the plant was known since very early times.

From the brief Ch'in (221-206 B.C.) and the long Han (206 B.C. — 220 A.D.) dynasties, while historic records of *Cannabis* are varied and numerous, there are also some significant archeological findings pertaining to the presence and varied uses of *Cannabis*.

Concerning the use of hemp as a textile fiber, actual complete specimens of hemp cloth were found used as covers for corpses in two of the three large graves of the late Western Han dynasty, about 1st cent. B.C. — 1st cent. A.D. in Kansu province (Kansu Museum, 1972). These coverings were wrapped around silk dresses and tied with ropes also made of hemp. Hemp fibers were also used in reinforcing plasters on the inside of the

brick walls of the crypts of the graves.

In regard to the use of hemp as a raw material for paper making, the earliest known specimens of paper were recently discovered in a grave in Shensi province. These fragments of paper were made of hemp fibers. The graves were of the period preceding the reign of Emperor Wu (104-87 B.C.) of the Han dynasty (Pan, 1964), thus antedating the supposed date of the invention of paper by Marquis Ts'ai Lun in the year 105 A.D. (Fig. 4).

One of the most extraordinary archeological discoveries in recent times is the unearthing of a well preserved woman's body from an early Han tomb 2,100 years old at Changsha, Hunan province. Along with the body over a thousand sacrificial items were preserved intact in this well sealed and insulated grave. These items include silk fabrics, lacquer ware, pottery, bamboo and wooden wares, and food stuffs. Besides fruits such as pears, peaches and jujubes, there were grains such as rice, wheat, millet, hemp seed, and mustard seed. Hemp seed was clearly used in early Han times as a common grain along with the other cereals. (K'ao-ku 1972).

During the Han and later the T'ang dynasty (618-906 A.D.) China was at its peak of expansion, and both commercially and politically busy contacts with central Asia and western Asia were operating through the deserts of its north-

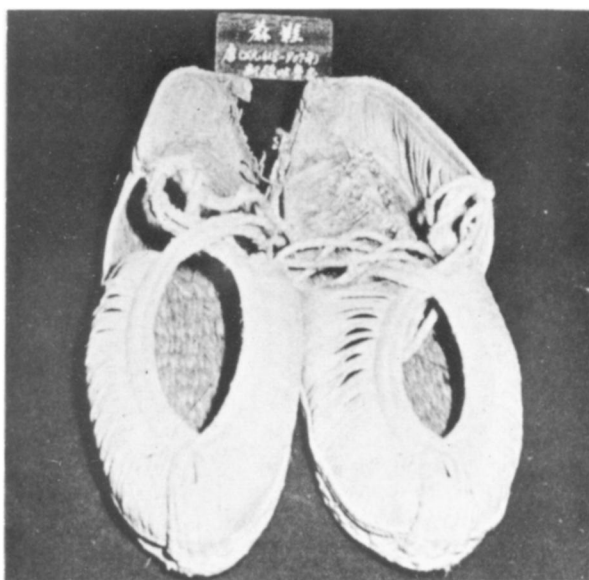


Fig. 5. Shoes made of hemp fibers from a grave at Turfan, in Sinkiang, 721 A.D.



Fig. 6. Shoes made of fine yellow hemp cloth from a grave at Turfan, in Sinkiang, 721 A.D.

western borderlands. The famous "silk road" carried silk, porcelain and other products to the western world. Many relics along this route have been discovered, as the dessication was especially suitable for preserving artifacts. From graves and deserted habitations, silk and silk fabrics have been found in especially large quantities and some hemp products were found along with them. These were apparently products of Chinese origin, carried west by traders.

Several recent finds among the eight-century-old cemeteries of Astana and Karokhoja at Turfan in Sinkiang province are of special cultural importance (Sinkiang Museum, 1972a, b). In one grave was found a rare fragmentary script of the *Lun Yü* (Analects of Confucius) written in 716 A.D. on white hemp paper. Also found were paper shoes made of pasted layers of white hemp paper sewn together with white hemp threads. In the same grave was a complete cloth sheet of hemp fabric.

In another grave dated 721 A.D. there was hemp cloth as well as hemp shoes. The latter were of two kinds, one woven of hemp fibers and the other sewn in a fine yellow cloth. The latter is an actual specimen of a famous cloth produced in Szechuan province and well known in earlier times, especially in the Han dynasty (Figs. 5, 6).

HISTORICAL RECORDS

In the early classics of the Chou dynasty, written over 3,000 years ago, mention is often made of a prehistoric culture based on fishing and hunting, a culture without written language but which kept records by tying knots in ropes. Nets were used for fishing and hunting and the weaving of nets eventually developed into cloth-making. These earliest written traditions seem to corroborate modern archeological discoveries of the Neolithic culture in northern China, and support the idea that hemp was used from the earliest times and is unquestionably indigenous.

Besides being important as a textile fiber plant, Cannabis was also an important food plant from the very beginning. In the

Shih Ching, (Book of Odes), which extended through the Chou period, the hemp plant was mentioned no less than seven times in the three hundred odes, mostly as a fiber but also as a grain. The cultivation of hemp was briefly mentioned as well as the preparation of the fibers and use of the textile in making a robe.

In the *Li Chi* (Records of Rites) and *Chou Li* (Rites of Chou), the use of hemp cloth was mentioned in some detail. Hemp and silk were the two sources of textile fibers, the first for the use of the masses and the latter for the wealthy and the aged. In all subsequent literature, hemp and silk or the hemp plant and mulberry plant are mentioned together as metaphors for either women's work or cultivated lands.

Noteworthy is the passage in the *Li Chi* which states that in ancient times people clothed themselves with feathers and skins and that later some sages invented fabrics of hemp and silk. The *Li Chi* also gives specific instructions about using hemp cloth for mourning rites at the deaths of ones parents. This tradition has been carried on through the centuries down to recent times.

In the *Li Chi*, hemp seed was mentioned as an important grain and specifically as being used by kings during certain months. In the *Chou Li*, the term "nine grains" was employed and in the *Li Chi*, the term "five grains" was mentioned. The word *k'ü* or "grain" of the ancients indicated important cereals as well as non-cereal grains. Some later commentators include *ma* (hemp) along with several kinds of millet, barley, rice, soybean and others as early grains.

In the early literature, besides the character *ma*, referring to the hemp plant in general, there appear several other characters: *i* or *si*, for the male plant, *chu* or *tsu* for the female plant, *fên* or *bên* for the fruit clusters, and *ma-tzu* or *ma-jên* for the seeds. This extensive differentiation clearly indicates the close association of the ancients with this plant.

In the oldest history, *Shu Ching* (Classic of History), the chapter "Tribute of Yu" mentions the male hemp plant, *i*.

This male hemp plant, which was the source of excellent fibers, was indicated as a product of the provinces Yu-chou and Ts'ing-chou (modern Honan and Anhwei provinces) in central China.

Ma was mentioned in other classical writings such as the *Lun Yü* (Analects of Confucius) and *Mo-tzü*. The most important account about *Cannabis* extant is found in the two chapters on agriculture in the work *Lü-shih ch'un-ch'iu* (249-235 B.C.), based on an earlier agricultural work of the Chou period. In this *ma* was mentioned as one of the "six grains," along with two millets, rice, soybean, and barley. It was mentioned together with silk as the fiber for textiles, and as one of women's assigned responsibilities. Brief mention was made of the timing of plantings to obtain fibers of high grade.

The hemp plant was frequently mentioned in Han historical works and other writings since it was one of the most important crop plants in ancient China. An important early agricultural treatise which has survived through quotation in other works, *Fan shêng-chih shu* (Book of Fan Shêng-chih), was composed by an official about 32-7 B.C. One chapter was devoted to the planting of *i*, the male hemp plant used as fiber. Another was devoted to *ma*, the female hemp plant from which seeds were collected. These chapters treated the proper time of planting, preparation of the land, fertilization, watering, tending, and collection. Even more detailed instructions were given in the *Ch'i-min yao-shih* (Essential Arts for the People) of the 6th century, the earliest existing complete agricultural treatise. The need of fertilizing fields for planting with hemp was especially emphasized.

A very important contribution of hemp fiber to the Chinese culture, as indeed to the culture of mankind as a whole, is the role it played in the invention of paper. According to the dynastic history *Hou-Han shu*, paper was invented by the Marquis Ts'ai Lun. He used "old fish nets, ragged cloth, hemp fibers, and tree bark" to make paper and presented his new invention to the throne in 105 A.D. Fish nets and cloth at that time were also made of hemp fibers.

Ts'ai Lun was probably responsible for perfecting a technique that had been in use for some time. As mentioned earlier, the oldest existing paper was recently discovered in a grave in Shensi province dating before the reign of Emperor Wu (104-87 B.C.) of the Early or Western Han dynasty. This paper proved to be made of hemp.

In surveying the ancient literature, Ho (1969) found only one reference to wild *Cannabis*. In the work *Tung-kuan Han chi* (28 A.D.) it is stated that after a year of great famine caused by war and natural disasters, wild grains were found growing everywhere, *Cannabis* and soybeans especially appearing in great abundance. Ho points out that this statement concerning wild plants is not definite since it is more likely that these plants were only escapes from abandoned crops of the previous year. However, this reference does indicate that during the Han period hemp seed was used as a common grain.

The use of hemp seed as a grain gradually diminished as it was apparently replaced by superior cereal grains. This use, however, must have persisted at least until the 10th century. In both the dynastic history of Southern Ch'i (470-502 A.D.), *Nan-Ch'i shu*, and in one verse of the T'ang poet P'o Chu-i (772-846 A.D.), a porridge made of hemp seed was mentioned. In later ages it was completely forgotten as a human food.

The use of oil from hemp seeds was apparently a later development since it involved the process of extraction. Hemp seed oil was used for frying food but had even more industrial applications. The ancient Chinese preferred mucilaginous vegetables and oily grains. Later, when technological development enabled the extraction of oil from seeds, mucilaginous vegetables and some oily grains, such as hemp seed, became less desirable and were gradually replaced by other, more edible, foods (Li, 1969).

The use of *Cannabis* in medicine was probably a very early development. Since ancient men used hemp seed as food, it was quite natural for them to also discover the medicinal properties of the plant. *Cannabis* was mentioned in the famous



Fig. 7. Illustration of hemp plant with text describing its functions from the *Chêng-lei pên-ts'ao*, edition of 1234 A.D.

herbal *Pên-ts'ao Ching*, attributed to the legendary Emperor Shên-nung of about 2,000 B.C. but actually compiled in the first or second century A.D. in the late Han dynasty. This work was apparently based on early traditions passed down from ancient, even prehistoric times.

A statement in the *Pên-ts'ao Ching* of

some significance is that *Cannabis* "grows along rivers and valleys at T'ai-shan, but it is now common everywhere." Mount T'ai is in Shangtung province, where the cultivation of the hemp plant is still intensive to this day. Whether or not this early attribution indicates the actual geographical origin of the cultivation of the

Cannabis plant remains to be seen.

Concerning the medicinal properties of Cannabis, the *Pên-ts'ao Ching* states that "ma-fên (fruits of hemp) . . . if taken in excess will produce hallucinations (literally "seeing devils"). If taken over a long term, it makes one communicate with spirits and lightens one's body."

It was about this time that a famous physician Hua T'ao (117-207 A.D.), according to the dynastic history *Hou-Han shu*, was using a concoction of Cannabis called *ma-fei-san* (hemp-boiling-compound) taken with wine, to anesthetize his patients in order to perform operations on abdominal organs. His disciple, Wu P'u, wrote an herbal in 200 A.D. in which he clearly made the distinction between the toxic hemp fruits (ma-fên) and the non-poisonous seeds or kernels.

The *Pên-ts'ao Ching* was subsequently revised by the famous physician and Taoist priest T'ao Hung-ching of the 5th century. He supplemented this work with his *Ming-i pieh-lu*, which was finished around 500 A.D. In this work, he noted not only the difference between the non-poisonous seeds and the poisonous fruits (ma-fên), but also that the latter was used "by necromancers (or magicians), in combination with ginseng to set forward time in order to reveal future events."

The effect of temporal distortion or hallucinations caused by Cannabis was noted by later authors such as T'ang Shen-wei in his *Chêng-lei pên-ts'ao* of the 10th century (Li, 1964) (Fig. 7). In these herbals, Cannabis was used in the cures of many diseases. Many prescriptions were made employing its analgesic effect, especially for severe pain due to broken bones. Plant parts used for these purposes include root, leaves and fruit-clusters. This information was collated in full in Li Shih-chên's famous Ming dynasty materia medica, *Pên-ts'ao Kang-mu*, 1590.

The use of Cannabis as an hallucinogenic drug by necromancers or magicians is especially notable. It should be pointed out that in ancient China, as in most early cultures, medicine has its origin in magic. Medicine men were practicing magicians. In northeastern Asia, shamanism was widespread from Neolithic down to re-

cent times. In ancient China shamans were known as *wu* (Needham, 1962). This vocation was very common down to the Han dynasty. After that it gradually diminished in importance, but the practice persisted in scattered localities and among certain peoples. In the far north, among the nomadic tribes of Mongolia and Siberia, shamanism was widespread and common until rather recent times.

From the middle ages to the present, Cannabis has remained an important fiber plant in northern China. When other fiber plants from the southern warmer regions of the country became known, the word *ma* became a generic name for plant fibers. Thus *chi-ma* is *Boehmeria nivea*, *ching-ma* is *Urtica thunbergii*, *chung-ma* is *Abutilon nivea*. Hemp, in order to distinguish it from other fiber plants, was named *Han-ma* (Chinese *ma*) or *hou-ma* (fire *ma*). Cotton was not introduced into China until the Sung dynasty, around the 10th to 11th centuries.

The hemp plant is no longer much used in medicine. It has been long forgotten as an edible grain. Whether or not it is still used by magicians as a drug must be a well-guarded secret; it is no longer so used by people in general except perhaps by some borderland non-Han tribesmen (Li 1974). The plant is cultivated today primarily for its fibers.

In the early days of the Ch'ing (Manchu) dynasty, about 300 years ago, Cannabis was still the only fiber plant in some parts of northern China. In the northeast (Manchuria), along the border near Siberia, for instance, when Chinese exiles first entered these hitherto forbidden regions, they found that the native Manchu tribesmen did not have the cotton plant and had only hemp. As shown by the accounts of Wu T'sêng-ch'eng on Ningku-t'a and Yang Pin on Liu-pien, both written around 1600, the natives were then largely hunters doing some supplementary cultivation. The people mainly used animal skins for clothings and only the wealthy had dresses of hemp cloth which were padded with hemp fibers for the winter.

In recent times Cannabis has been cultivated as a fiber plant over nearly all of

China, particularly in the northern and central regions. In Shangtung province, large quantities are produced for export (P'ei and Chou, 1951; Ts'ui, 1953; Hu, 1955). Since the introduction of cotton in the 10-11th centuries, however, the cultivation of Cannabis had gradually diminished. The fibers are presently used for making ropes and make coarser grades of cloth, largely for packing purposes.

As hemp is mainly used for fibers in China, the strains now cultivated have apparently been selected for this purpose. Compared with Cannabis growing in other Asiatic countries, the Chinese plants are among the tallest and have the lowest resin content. In eastern and southern China, plants growing to a height of 21 feet have been noted by botanical collectors in modern times (Bretschneider, 1898).

Of interest is the fact that large-seeded forms are known from such areas as Heilungkang (Liou, 1959) in the Amur region in the extreme northeast bordering Siberia. These may constitute relics of the grain usage of the past.

USES OF CANNABIS AND ITS DIFFUSION

Cannabis is generally treated as a monotypic genus. The species, *Cannabis sativa* is an extremely variable one. As noted in the beginning of this report, wild plants spread over a wide region from the lower Volga and the Caucasus in the west through central Asia to the Altai Mountains and all the way east to northern China. These plants, however, are probably not genuine wild plants but spontaneous plants escaped from early cultivation. The Cannabis plant, both wild and cultivated, needs a rich soil. It is thus a natural follower of the migrations of man, as human habitats provide a compatible environment for the plant. Furthermore, as an annual, Cannabis has found possible to extend its range, under human tutelage, beyond its original range in all directions, longitudinally and latitudinally.

From the available historical evidence, it seems more likely that the origin of cultivation of Cannabis was in the east,

subsequently spreading westward, than the other way around.

Our review shows that Cannabis has been used in China since very early times as a fiber plant as well as a grain crop and a medicinal plant. There is a continuous history of cultivation from Neolithic times down to the present.

Among the various usages, its use as a textile fiber remains its prime function through the ages. Its use as a food plant, first as a grain and later also as a source for oil, gradually diminished in importance and eventually was completely forgotten. The use of the plant in medicine, especially as a hallucinogen, was apparently associated with the extensive practice of shamanism in northeastern Asia. Since the Han dynasty, shamanism in China has gradually declined. In conjunction, the use of Cannabis as a hallucinogen was greatly restricted. On the other hand, shamanism was extensively also practiced among the nomad tribes to the north of China. The great mobility of these peoples apparently assisted the movement of the plant to central and western Asia, and from there to India, where its hallucinogenic use intensified. The decline of the use of Cannabis in China as a hallucinogen is attributed to cultural factors (Li, 1974).

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Book Reviews (continued from page 413)

It would appear that the purpose of printing this volume is to point out those arctic species found also in Italy (marked with an asterisk) and as a medium for the reporting a few of the author's collections. The line drawings are of poor quality and leave much to be desired, and the few that are tinted are hardly true to color.

Flora Arctica is not recommended for the serious student of arctic plants; there are far better floras readily available. It may however be of some interest to Italian students of botany.

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Rubber in Malaya 1876-1922. The Genesis of the Industry. J. H. Drabble. 256 pp. illus. Oxford University Press, New York, 1973. \$19.25

Why another book on the rubber industry of southeast Asia? Much has already been published on the cultivation and improvement of *Hevea brasiliensis*, one of man's most recently domesticated economic plants. Most of the available works, however, wholly or mainly are concerned with agronomical or plant-improvement aspects of the industry. Drabble, lecturer in the Department of History, University of Malaya, has produced a superb history-oriented account of the rubber industry of



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The Origin and Use of Cannabis in Eastern Asia

Linguistic-Cultural Implications¹

HUI-LIN LI²

Cannabis sativa is one of man's oldest cultivated plants. Botanically it is distinct from all other plants and readily recognized. Yet among individual plants it is extremely variable. It now grows spontaneously in great abundance and ubiquity. While most botanists consider the plant monotypic, some regard it as consisting of more than one species and a number of varieties, and so propose several different systems of classification. The systematics of this plant still awaits classification by further botanical studies.

Cannabis is generally believed to be an Asiatic plant. There is no concerted agreement among botanists as to where the plant originally grew wild and where its cultivation first began. Estimates range within the wide span of temperate Asia from the Caucasus Mountains and the Caspian Sea through western and central Asia to eastern Asia. There is no easy way to distinguish between wild and spontaneous or adventitious, and semi-cultivated or cultivated plants. Therefore, much remains to be done in determining the geographical origin of the plant.

These difficulties in classification and origin arise from the long and close association of Cannabis with man. Man has caused its extreme variations and wide dispersion. It will no longer suffice to study the plant itself alone. The influence of man must be considered side by side with the botanical facts in order to unveil the complex nature of this plant.

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Submitted for publication October 5, 1973.

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Historically, the oldest records in existence seem to place the origin of cultivation in northeastern Asia, a portion of which falls in present northern China where the early Chinese civilization began. Cannabis has left a continuous record of its presence in this area from Neolithic times down to the present day, and its uses were closely integrated with the life and culture of the people throughout all periods.

As a cultivated plant, the Cannabis plant had multitudinous uses in ancient times in China, another fact attesting to its antiquity as a cultivated species. Besides its importance as a fiber plant, it was also an important food plant, one of the major "grains" of the ancients. And it was an important medicinal plant.

The earliest or primary use of the plant was probably for its fibers. It was the only fiber plant (hemp) known to ancient peoples in northern China, northeastern China, and eastern Siberia. In China its use was so extensive and important that from the earliest times the phrase "land of mulberry and hemp" was used as a synonym for cultivated fields. Mulberry trees were planted for their leaves used to feed silkworms. These, in turn, produced the unique product, silk, that made China famous in other lands. Silk fabrics were used by the wealthy while hemp cloth was the textile of the masses.

Textile fibers are next to cereal grains in importance to the founding of human culture. From the standpoint of textile fibers, three centers can be recognized in the ancient Old World — the linen culture in the Mediterranean region, the cotton culture in India, and the hemp culture in eastern Asia. Each of these seemed to have developed independently, and their uses were unknown to each other for quite a

long time (1).

Evidence of the use of hemp fibers has been found in Neolithic records in northern China. This evidence appears as paintings of or impressions of ropes and woven cloth on pottery, as well as stone or pottery instruments of weaving: spinning-whorls and bone needles. Andersson (2) first discovered the Neolithic culture in Honan province. It has become known as the Yang-shao culture and is characterized by painted potteries. Andersson believed that these traces pertained to hemp. Relics of this culture are now dated by the carbon-14 method as around 5,200 to 6,200 years ago (3). Many subsequent excavations have revealed that this culture extended along the Yellow River Valley to northeastern China. The presence of hemp has been supported by the findings of several other workers. Hemp was also found in discoveries of later Neolithic cultures such as the Lung-shan culture of about 3,200 to 4,200 years ago. Archeological records have shown that hemp was continuously present in northern China from Neolithic times through all historic time down to the present (4).

The ancient use of hemp as a fiber is substantiated by written records. Ancient literature indicates that hemp fibers were used since time immemorial for making ropes and fishing nets. Knots were tied in ropes as a means of record keeping before written language. Fishing was believed to have preceded the domestication of animals.

The great cultural importance attached to hemp as a textile fiber is clearly indicated by the practice, since Confucian times, of wearing hemp fabric clothes while mourning the death of a parent or parents. The practice was prescribed in the *Li Chi* (Book of Rites) of the second century B.C. and was meticulously followed through all ages down to recent times. The great emphasis on filial piety in the Chinese culture indicates the significance of such a long tradition.

A further distinctly important contribution of hemp fiber to the Chinese culture, as well as to the culture of mankind as a whole, is the role it played in the invention of paper. Paper originated in

China in the late Han dynasty. According to the dynastic history *Hou-Han shu*, the Marquis Ts'ai Lun used old fish nets, ragged cloth, hemp fibers, and tree bark in making paper and presented his new invention to the throne in 105 A.D. Fish nets and cloth were also made of hemp fibers. Ts'ai Lun probably perfected a technique that had been in use for some time. The oldest existing paper, proven to be made of hemp, was recently discovered in a grave in Shensi province. The grave dates from before the reign of Emperor Wu (104-87 B.C.) of the Early Han dynasty (5).

The original and primary use of Cannabis as a fiber plant also has linguistic evidences. The character *ma*, in the ancient *chuan* script, was derived from ideographic components representing fibers hanging on a rack and placed under a roofed shack. Having evolved from the ancient to the later styles, it remains the character for hemp (Fig. 1). When in later times other fiber plants from the warmer regions of the south, as well as introduced plants from foreign countries became known, the character *ma* developed into a generic name for fiber, and hemp itself was known as *ta-ma* (great ma), sometimes as *Han-ma* (Chinese ma), or *hou-ma* (fire ma).

At a very early period the Chinese recognized the Cannabis plant as dioecious. While the name *ma* was applied to the plant in general, the male and female plants were accorded distinct names. The male plant was called *i* or *hsi* and yields the superior fiber. The female plant, known as *tsü* or *chü*, yields edible seeds and inferior fibers from the stem. Furthermore, the male flower clusters were called *p'o*, the fruiting clusters *fên* or *pên*, and the seeds *ma-jên* (Fig. 2). This ancient differentiation reflects the antiquity of the cultivation of the plant in the same way that it points to an enduring and varied relationship between man and plant.

This differentiation also suggests that the use of Cannabis as a food plant had a very early beginning. Hemp seeds were considered, along with millet, rice, barley and the soybean, as one of the major

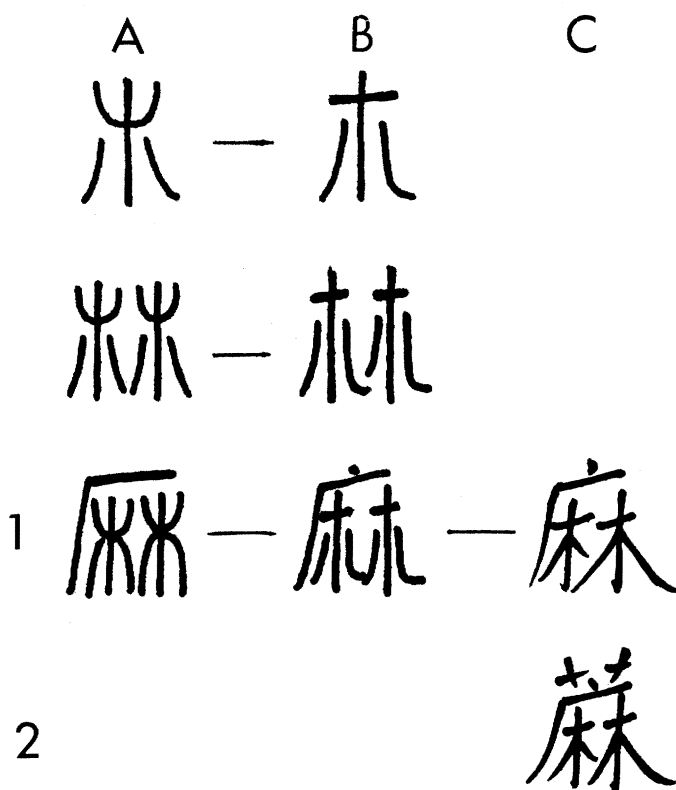


Fig. 1. Evolvement of the character *ma* or hemp (line 1). Column A, archaic *chuan* script, B, plain *chieh* script, C, cursive *hsing* script. Line 2 represents the vulgar word for *ma* with the added "grass" radical.

grains of ancient China. Its use as a fiber as well as a grain was mentioned in such classical literature as the *Shi Ching* (Book of Odes), and *Li Chi* (Book of Rites), both of about the first and second century B.C. or earlier. Detailed instructions on the cultivation of hemp as both a fiber and a grain crop were given in the most ancient works on agriculture in existence.

The use of oil from hemp seeds was a later development since it involved the more complicated process of extraction. As grains, the seeds were used until at least the 6th century A.D. In later times the grain was completely forgotten, due apparently to its replacement by other, superior, cereal grains.

As ancient man used hemp seeds for food, it was quite natural for him to also discover the medicinal properties of the

plant. The edible seeds are enclosed in fruit-coverings which contain a toxic resinous substance. In the earliest medical literature this differentiation was clearly noted.

Definitive records of the medicinal and physiological effects of *Cannabis* are found in the earliest pharmacopeia in existence. The famous *Pên-ts'ao Ching*, attributed to the legendary Emperor Shên-nung of about 2,000 B.C., was compiled in the first or second centuries A.D., but was undoubtedly based on traditions passed down from earlier — even prehistoric — times. It states that "ma-fên [the fruits of hemp] . . . if taken in excess will produce hallucinations [literally 'seeing devils']. If taken over a long term, it makes one communicate with spirits and lightens one's body" (6).

麻
 枲
 苴
 蕒
 麻勃
 麻仁

ma HEMP

hsi ♂HEMP

chü ♀HEMP

pên HEMP FRUITS

ma
p'ò HEMP FLOWERS

ma
jên HEMP SEEDS

Fig. 2. Different names for the hemp plant and its parts.

The famous physician Hua T'ò (110-207 A.D.) lived at about this time. The dynastic history, *Hou-Han shu*, records that Hua T'ò used *ma-fei-san* (hemp-boiling compound), to be taken with wine, to anesthetize his patient during surgical operations on abdominal organs. After the operation magical balm was applied, and the patient recovered in due time. Wu Pu, a disciple of Hua T'ò, wrote an herbal in 200 A.D. in which he made a clear distinction between the toxic hemp fruits (*ma-fên*) and the non-poisonous seeds or kernels.

Worthy of note is the work of the famous physician T'ao Hung-ching, of the 5th century A.D. In his *Ming-i pieh-lu*, he noted the difference between the non-poisonous seeds (*ma-tze*) and the poisonous fruits (*ma-fên*). Of the latter he said, "Ma-fên is not much used in prescriptions

(now-a-days). Necromancers use it in combination with ginseng to set forward time in order to reveal future events."

In addition to the above statement about the temporal distortion caused by Cannabis, there is a similar passage in the later work *Chêng-lei pên-ts'ao* by T'ang Shêng-wei of the 10th century A.D. He stated that "Ma-fên has a spicy taste; it is toxic; it is used for waste diseases and injuries; it clears blood and cools temperature; it relieves fluxes; it undoes rheumatism; it discharges pus. If taken in excess it produces hallucinations and a staggering gait. If taken over a long term, it causes one to communicate with spirits and lightens one's body."

That the stupefying effect of the hemp plant was commonly known from extremely early times is also indicated linguistically. The character *ma* very early

麻 + 鬼 = 魔
 devil demon

麻 + 石 = 磨
 stone grind

麻 + 非 = 靡
 negative waste

麻 + 手 = 摩
 hand rub

麻 + 米 = 糜
 rice porridge

Fig. 3. *Ma* as a component radical with the connotation of “numbness” in the 3 characters above and of “numerous” in the 2 lower ones.

assumed two connotations. One meaning was “numerous or chaotic”, derived from the nature of the plant’s fibers. The second connotation was one of numbness or senselessness, apparently derived from the properties of the fruits and leaves, which were used as infusions for medicinal purposes.

As a radical, *ma* combines with many other radicals to form such characters as

mo, demon (combining *ma* with “devil”), *mo*, grind (combining *ma* with “stone”), *mi*, waste (combining *ma* with “negative”), *mo*, rub (combining *ma* with “hand”), *mi*, porridge (combining *ma* with “rice”) (Fig. 3). As a character it combines with other characters to form such bisyllabic words as *ma-tsui*, narcotic (*ma* and “drunkenness”); *ma-mu*, numb (*ma* and “wood”); and *ma-p’i*,

麻 醉	narcotic
麻 木	numb
麻 痺	paralysis
麻 亂	tangle
麻 煩	troublesome

Fig. 4. *Ma* as a character in several bisyllabic words.

paralysis (*ma* and “rheumatism”) (Fig. 4).

It should be mentioned that in ancient China, as in most early cultures, medicine had its origin in magic. Medicine men were practicing magicians. The evidence quoted above suggests that the medicinal use of the hemp plant was widely known to the Neolithic peoples of northeastern Asia and shamanism was especially wide-spread in this northern area and also in China, and *Cannabis* played an important part in its rituals. The great

mobility of the nomadic tribes north of China apparently assisted the movement of the plant to western Asia and from there to India, where its use as a drug intensified. While shamanism, and the use of *Cannabis* in particular, were on the upswing in these other Asiatic locales, hallucinogenic practices slowly declined in China beginning with the Age of Confucius. Only in scattered small areas did shamanistic traditions continue in China during later ages.

The discontinuation of the use of Can-

nabis as a drug in China was due to certain traceable causes. The Chinese were not adverse to taking drugs in order to alter states of consciousness. Wine was taken from very early times, though in general it was never used excessively. An exception was during the earliest historic dynasty when the Yin-Shang people of the 18-12th centuries B.C. were known to imbibe wine in great quantities. They created many kinds of elaborate bronze wine vessels which are among the greatest artistic achievements of ancient peoples. During the 3rd century the *Wu-shih san* (5 minerals compound), a prescription containing cinnabar (mercuric sulfide), was widely used in China by certain groups. As a drug, it produced certain physiological effects and some mental stimulation. Since it was expensive, its use was confined to the wealthy upper class, especially the intelligentsia. During this period of great political disorder, the intelligentsia, seeking escape from oppressive circumstances, resorted first to excessive drinking and later to the use of this drug. Its high toxicity apparently led to the subsequent decline of its use. But even in the T'ang dynasty (618-906), this or similar drugs containing mercury and sulfur were used as elixirs of longevity.

In more recent times tobacco has been adopted with the same enthusiasm it has met in other parts of the world. Opium was first introduced, perhaps by the southern sea route, as a medicine from western Asia. From the time of its introduction in the 8th century A.D., it was gradually adopted as a narcotic. Its adoption was undoubtedly aided in the beginning by the use of tobacco as an accompaniment. In the 19th century, under military pressure from foreign powers, its import and use became common throughout China.

The adoption of the introduced substance opium, in contrast to the lack of general use of the indigenous Cannabis, can be explained on a cultural basis. Opium is an *Euphorica*, a sedative of mental activity. Cannabis, on the other hand, is a *Phantastica*, an hallucinogenic drug that causes mental exhilaration and nervous excitation. It distorts the sense of

time and space. Overuse may cause rapid movements and under certain situations stimulate uncontrollable violence and criminal inclinations.

These effects were duly noted by Chinese physicians at least from the second century A.D. or earlier. They were in every respect inconsistent with the philosophy and traditions of Chinese life. The discontinuation of the use of Cannabis by the Chinese can perhaps simply be referred to its unsuitability to the Chinese temperament and traditions.

From ancient times Chinese culture was characterized by two basic streams of thought, closely interwoven and permeating the life of its people at all levels of education. The dominant stream was Confucianism, or more correctly *Ju-chia*, which had its beginning long before Confucius, although it was greatly developed by him. Confucianism is more a moral system or philosophy of life than a religion, though it has been, for many people, a substitute for the latter.

The teachings of the Confucian School set up a body of ethical doctrines emphasizing the principle that the Universe is regulated by a Natural Order which is moral in essence. Man, the superior being, is a moral entity who can refrain from wrong doing through education and through the observance of the doctrines of uprightness and moderation (the doctrine of the Mean). Education involves such outward means of development as studying classical teachings, rules of propriety and ceremony, as well as an inward means of self-improvement through the recognition of one's own nature as a moral being and by constant watchfulness over one's self in solitude. Goodness consists of such fundamental virtues as *Jên* (benevolence), *I* (righteousness), *Li* (propriety), *Chih* (intelligence), and *Hsin* (faithfulness). Having achieved a state of knowledge of this self-discipline, the learned scholar has the responsibility of setting himself up as an example for the masses. Furthermore, the practical virtues of filial piety, reverence for ancestors, and respect for elders are emphasized.

The other stream of ancient thought, a more passive and fundamental one, is

Taoism. Taoism actually encompasses two quite distinct movements. The Taoist school of philosophy, as expounded by ancient philosophers, emphasized the doctrine of nonaction. *Tao* has the meaning of a road or way. It signified the course of nature, and the harmony between nature and man. The teachings of these Taoist philosophers were adopted by priest-magicians and passed down from generation to generation, developing gradually into a religion, or pseudo-religion, in the Later Han dynasty. This religion involved a multiplicity of gods and idols. The priests offered divination and magic as a means to inward power, restored youth, superhuman abilities and immortality. To most Taoist followers, who simultaneously followed Confucianism and Buddhism, the Taoist religion was essentially a sanction of the ethics of simplicity, patience, contentment and harmony.

At about the time that Taosim had developed into a religion and therefore was more capable of satisfying deeper instincts within the human nature, Buddhism was introduced into China from India. While Buddhism had a more complete theology and, in the beginning, underwent years of rivalry with Taosim and Confucianism, all eventually settled down in peaceful coexistence, borrowing and lending ideas and methods. Buddhism in many ways became highly sinicized. Ch'an (Zen) Buddhism, or the Meditation School, became the dominant school of Buddhist thought in China. It professed the doctrine of self-improvement, which, while difficult, offered man a means whereby he could use his innate resources to overcome obstacles. This doctrine closely approaches Confucianism. In the last analysis Ch'an is more a moral philosophy than a religion. It is also interesting to note that meditative Buddhism developed mainly among the Chinese rather than among the peoples of India. On the other hand, the neo-Confucian School, which has become the main stream of thought in the thousand years since the Sung dynasty, has been considerably affected by Buddhism and Taoism (7).

The Chinese culture is characterized by its uniformity and continuity. In spite of

the vicissitudes of war, invasion and natural disaster, that culture is remarkable in its continuous, unbroken history. An historical orientation permeates every level of Chinese society, and is manifested in everyday life in the strong family system, ancestor worship and filial piety. Geographically, the uniformity of basic philosophy at all levels of culture is remarkable, defying wide distances, climatic variations and linguistic differences.

We cannot fail to ascribe this uniformity and continuity in part to the unique written Chinese language. Its monosyllabic characters can be traced back continuously for thousands of years to the early ideograms from which they were derived. The oldest documents can thus be read or deciphered. Even though there are numerous spoken dialects in China, the same nonphonetic, ideographic written language can be used and understood in every part of the vast country.

Despite the risk of oversimplification, we can conclude that the Chinese culture, in conditioning the reflexes of the Chinese mind, is characterized by a dislike of metaphysics and its common-sense view of morality. The traditional Chinese philosophy of life is centered on humanism. It thus emphasizes in particular interpersonal relations. Compounded by its universally adopted doctrine of the Mean and its strong social system based on the family, these cultural influences seem to provide sufficient background for the universal failure to adopt a drug which causes hallucination and fantasy (8).

If we consider first the question of the Chinese family life, which is the primary socializing agency, the difference between the effects of Cannabis and opium can be readily seen. The fantasy, unreality and sometimes violence caused by Cannabis would disrupt family life, a life which follows the doctrine of moderation and frowns on extremes and excess. On the other hand, the sedative effect of opium is more compatible, especially in view of the large size of families where several generations live together. It could be used communally, often in surroundings containing the other amenities of life. In a way it incidentally served to preserve the large

extended family system, thus reinforcing the teachings of filial piety and ancestor reverence. In reality, it was not uncommon to find the use of opium by the younger generation encouraged by their elders who were eager to keep the family and its fortune intact.

That there is a cultural background associated with the non-use of Cannabis can be illustrated vividly by a situation in the remote hinterlands. To the northwest in the Sinkiang province (often known to the West as Chinese Turkestan), the Han Chinese, mostly immigrants, live side by side with the native tribes, the Uigurs being the majority. A travel record of 1919 (7) showed that during the first quarter of the 20th century, the Chinese were outnumbered 5 to 1. Large quantities of Cannabis were grown there at that time for export to Kashmir and India. It was also used by smoking locally by the young and old of the Uigurs and other native tribes, whose languages are different from that of Han Chinese. These non-Han people had adopted the Moslem religion. Before that, in the 13-14th centuries and earlier, they were largely shamanistic. In contrast to these tribal peoples, the Han Chinese minority were observed to refrain entirely from the use of Cannabis.

REFERENCES AND NOTES

1. Berthold Laufer, in his work *Sino-Iranica*, 1919, makes a point of great culture-historical interest about the "fundamental diversity between East-Asiatic and Mediterranean civilizations — there hemp, and here flax, as material

for clothing" (p. 293). In a footnote he says that he hopes to demonstrate in a subsequent study that hemp had been cultivated by the Indo-Chinese nations, especially the Chinese and Tibetans, in a prehistoric age. However, no such paper seems to have been actually published by him.

2. Andersson, J. G. An early Chinese culture. *Bull. Geol. Surv. China* 5 (1): 26, 1923.

3. An Chih-min, [On the problem of dating in the Neolithic culture of our country]. *K'ao-ku* 1972, 6: 35-44. 1972.

4. A more detailed account on the archeology and history of hemp in China will be given in a separate paper.

5. Pan Chi-hsin, [The earliest plant-fiber paper in the world]. *Wen-wu* 1964, 11: 48-49. 1964.

6. Passages of most of these older works were quoted or cited by Li Shih-chên in his *Pên-ts'ao kang-mu* [Materia Medica], 1590. Bretschneider, E. V., *Botanicon sinicum*, pt. 3, 1895, translates many of these entries into English.

7. The literature of Chinese culture is too extensive for citation here. As a representative for reference to the subject matter particularly concerned with this discourse, the work of Hsü, F. L. K., *Under the Ancestor's Shadow: Chinese Culture and Personality*, 1949, New York and London, may be mentioned.

8. The conformity of an individual in Chinese society is regulated by a culturally instilled sense of shame. The Confucian personality is a shame-oriented personality (Eberhard, W., *Guilt and Sin*. 1967, Los Angeles and San Francisco). The Western personality tends to be more guilt-oriented. The adoption of opium and the non-adoption of Cannabis reflect a behavioral response to traditional Chinese society. The opium user was more likely to remain pacific and sedated, and thus not challenge social norms. Cannabis, with its stimulation of erratic effects, was likely to induce acts that might bring shame upon the user or his family.

9. Hsieh Ping, *Hsin-chiang yu-chi* [Account of travel in Sinkiang], 1919, Shanghai.

Book Reviews (Continued from page 286)

exported over 6,000 tons of soybeans in 1971 to Hong Kong and elsewhere and is rapidly increasing production). And why not pen a few words on the importance of soybean milk, flour, paste, curd, cheese, mash, sauce, and oil? How about soybean sprouts? Aha! One may look in the index or just stumble upon a section headed "Bean sprouts" (pp. 270-272) devoted largely to those of the soybean!

In a half-page (p. 238) given to cluster bean, or guar (*Cyamopsis psoralioides*; better and more widely known as *C. tetragonoloba*), it is

stated that the pods may be eaten with curries and that the seeds are cooked as a vegetable. "Alternative uses of the plant are as a fodder crop, a shade plant for ginger and as a green manure to be ploughed into the land." After 3½ lines on cultivation, we are told, "This bean, very popular as a pulse in India, is not grown in Hong Kong." No mention is made of the intense interest in guar culture since 1947 and of the multiple and extensive uses of the seed gum in food and other industries. One begins to suspect that any updating of the manuscript was rather spotty.



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Japan's "Laughing Mushrooms"

JAMES H. SANFORD¹

Introduction: A Medieval Japanese Tale

I was first drawn to the following tale in the hope that it might serve as a source of information about the popular attitudes toward Buddhism in Medieval Japan. While it did not offer much help so far as Buddhism goes, it did lead me into a rather long investigation that focused not on Comparative Religion but rather on Mycology.

Long long ago, some woodcutters from Kyoto went into the Kitayama mountains and lost their way. Not knowing which way to go, four or five of them were lamenting their condition when they heard a group of people coming from the depths of the mountains. The woodcutters were wondering suspiciously what sort of people it might be when four or five Buddhist nuns came out dancing and singing. Seeing them, the woodcutters became fearful, thinking things like, "Dancing, singing nuns are certainly not human beings but must be goblins or demons." And when the nuns saw the men and started straight toward them, the woodcutters became very frightened and wondered, "How is it that nuns come thus out of the very depths of the mountains dancing and singing?"

The nuns then said, "Our appearance dancing and singing has no doubt frightened you. But we are simply nuns who live nearby. We came to pick flowers as offerings to Buddha, but after we had all entered the hills together we lost our way and couldn't remember how to get out. Then we came upon some mushrooms, and although we wondered whether we might not be poisoned if we ate them, we were hungry and decided it was better to pick them than to starve to death. But after we had picked and roasted them we found they were quite delicious, and thinking, "Aren't these fine!" we ate them. But then as we finished the mushrooms we found we couldn't keep from dancing. Even as we were thinking, "How strange!"

strangely enough we. . . ." The woodcutters were no end surprised at this unusual story.

Now the woodcutters were very hungry so they thought, "Better than dying let's ask for some too." And they ate some of the numerous mushrooms that the nuns had picked, whereupon they also were compelled to dance. In that condition the nuns and the woodcutters laughed and danced round and round together. After a while the intoxication seemed to wear off and somehow they all found their separate ways home. After this the mushrooms came to be called *maitake*, dancing mushrooms [*mai*, "dance"; *take*, "mushroom"].

When we think about it this is a striking story. For even though we still have this kind of mushroom, people who eat them do not dance. Thus this exceedingly strange story has been handed down.²

The foregoing account is from the 11th-Century Japanese folktale collection, the *Konjaku monogatari* ("Tales of Long Ago"). Many of the stories collected in the *Konjaku* were, as its title implies, relatively ancient stories that had come into Japan from India or China. However, some of the stories gathered together in the "Japanese Tales" section of the work represent retellings of actual events and thus might be as well called "folk history" as "folk tale." Certain literary considerations would tend to place this story in that category. In the first place, there is the unfinished and really rather pointless nature of the whole account. If it were a true folk tale that had been handed down orally from generation to generation, one would expect a tighter, more cohesive plot to have developed through time. Indeed, the story says so little, in and of itself, that it is hard to imagine that, if it had not been fossilized by the written word, it would have been passed on very long at all in such an un-

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² *Konjaku monogatari*shū, vol. 5, pp. 96-97.

embroidered form. Further there is the author/editor's very real perplexity about the "dancing mushrooms," which no longer live up to their name. If this were a standard just-so tale intended to give a folk etymology for the term "dancing mushroom," the action would probably be set in the mythical Age of Gods and there would be no expectation that the mushrooms would act in the same fashion today. Our author, however, seems to take the business of the mushrooms quite seriously and to be honestly puzzled by it. Assuming then, that the incident of the nuns and the woodcutters might be more or less historical, even we moderns — or at least the amateur mycologists among us — are left to wonder just what were these so-called "dancing mushrooms," *maitake*, that once caused people to dance with hilarity but at a later date had no such effect at all. One likely place to start such an investigation is to track down the modern usage of the term, if any.

Possible Identification of *maitake* as *Panaeolus papilionaceus*

A glance at the Japanese dictionaries showed that part of the problem was the old bugaboo of irregular usage of common names for plants and animals. The multi-volume encyclopedic dictionary, *Daijiten*, identified *maitake* as the edible mushroom *Polyporus frondosus* but added that the *maitake* mentioned in the *Konjaku* story was actually *waraitake*, the "laughing mushroom" (*warai*, "laughter"; *take*, "mushroom").³ *Waraitake* itself was identified as *Panaeolus papilionaceus*, of which it was said, "People who eat this mushroom get drunk. They may become extremely excited and dance and sing or see various hallucinations. Alternate names are *odoritake* ["jumping mushroom"] and

maitake."⁴ (*Odoritake* was not given a separate heading in the *Daijiten*.)

For further information, I turned to a more specialized source, Makino Tomitarō's *Shin Nihon shokubutsu zukan* (New Illustrated Compendium of Japanese plants), where *maitake* was identified as *Grifola frondosus* (*Polyporus frondosus*) and was said to be called the laughing mushroom because of its flared shape reminiscent of a dancer's skirts. Makino also mentioned the *Konjaku* tale and noted that the "*maitake*" mentioned there was not the same mushroom but "probably the laughing mushroom, *waraitake*."⁵ But no separate discussion of *waraitake* was offered.

At this point, the confusion over the toxicity or nontoxicity⁶ of "*maitake*" began to make some sense. Probably the author/editor of the *Konjaku* tale knew as *maitake*, the dancing mushroom *Polyporus frondosus* or some similar

⁴ *Ibid.*, vol. 23, p. 374.

⁵ Makino Tomitarō, *Shin Nihon shokubutsu zukan*, p. 963.

⁶ An early reader of this article expressed considerable dissatisfaction at my use of the term "toxicity" in reference to effects that were as mild or milder than those of alcohol and suggested that, "The same term should not be used for the toxic properties of an hallucinogen as for the toxin of the deadly amanita. It leads to confusion of thought." While I find this criticism quite valid in its way, there seems to me to be no present solution to the problem. Alternative terms such as "hallucinogenic" and "psychedelic" are not rigorously descriptive either. How many hallucinogenics actually produce something like hallucinations as their chief manifestation, for instance? Is the euphoric state induced by ingestion of marijuana to be classed with the much more complex mental phenomena associated with mescaline? Clearly we need a number of new and quite specific terms to designate these various non-normal states, but such an agreed-upon vocabulary has not yet developed. Lacking such a technical vocabulary, I have chosen neutrality as the best second-best procedure. Thus, the reader should keep in mind that my use of "toxic" and "toxicity" in this article is a very broad one and includes in principle at least, both very mild and very severe psycho-physiological manifestations.

³ Shimonaka Yasaburō, *Daijiten*, vol. 26, p. 149.

mushroom which derived its popular name from its flared shape, while the *maitake* mentioned in the body of the story represented the toxic *Panaeolus papilionaceus*, which because of the tendency to make people who ate it dance or jump or laugh compulsively, was likewise called *maitake*. It was also now clear that the most common name of the mushroom mentioned in the story was not *maitake*, "dancing" mushroom, but *waraitake*, "laughing" mushroom, and any attempt at an identification would have to be made on the basis of the usage of the second term.

Further examination of the Japanese sources soon made it clear that *waraitake* intoxication was not a phenomenon limited to Japan's ancient past. Kawamura Seiichi in his *Genshoku Nihon kinrui zukan* (Icones of Japanese Fungi) quoted the following verbatim report from a newspaper article in the *Hokkoku Shimbun* (The Northcountry News).

In Ishikawa prefecture, Hagui country, Hinogawa village, Oginotani, one Tsuta (age 40), wife of Ōda Yasutarō, and her elder brother were gathering plants on May 11, 1917, at about 2 p.m. in a place known locally as Inoya Mulberry field. As they were poking in the dirt on the Ogino-shima property of the Ichihoku Sannō Company they found a lot of grey mushrooms that looked like "chestnut mushrooms" growing at the base of a chestnut tree. Mrs. Ōda wanted to keep them since they seemed a lucky find but her brother warned her of the dangers of eating mushrooms whose identity was not wholly clear and she finally decided she would throw them out when she got home. However a neighbor, Mrs. Taniguchi Jūtārō (age 35), saw them and said that she had picked some very similar mushrooms at the same spot in March and asked to have a portion now. Mrs. Ōda, not wanting to be responsible for a poisoning, refused, but finally gave in under further pressure.

About eight o'clock that evening, Mr. Taniguchi (age 31), Mrs. Taniguchi and Mrs. Taniguchi's brother, Buntsuke (age 41), treated themselves to two bowls of mushroom soup while the elder Mrs. Taniguchi

(age 71) ate one bowl with only two or three mushrooms in it. They had hardly eaten when first Mrs. Taniguchi and then Mr. Taniguchi began to feel odd. Mr. Taniguchi then went next door to ask someone to fetch a doctor. When he got back home he found his wife dancing around stark naked, playing an imaginary *shamisen*, and laughing raucously. Even as he stood there amazed at all the uproar he found that he too was falling into the same crazed state. The older brother also eventually began to dance crazily. The intoxication of Taniguchi's mother was weaker, however, and though she became muddled she never lost complete control of her senses. She did, however, keep repeating the same words over and over and went to every house in the neighborhood apologizing throughout the night for "preparing such a poor meal" and thanking everyone "for putting up with it."⁷

In this case we have not only a fairly detailed description of *waraitake* intoxication but also a positive identification, for Dr. Kawamura was able to obtain samples of the mushrooms involved and solidly identify them as none other than *Panaeolus papilionaceus*.

Pholiota spectabilis Enters the Picture

It would seem that the "dancing mushrooms" of the *Konjaku* tale might very well be *Panaeolus papilionaceus*. However, Kawamura Seiichi's research opened still another possibility. For he noted of *waraitake* that, "The country people seem to distinguish two species, one *waraitake* growing on horse-manured ground and the other an orange colored fungus called *ō-waraitake* ['big laughing mushroom'], which grows on decaying stumps and logs." Though common usage might not be wholly consistent, Kawamura indicates that these names seemed generally to refer to *P. papilionaceus* in the case of *waraitake* (*Panaeolus papilionaceus* and several other related *Panaeolus* species

⁷ Kawamura Seiichi, *Genshoku Nihon kinrui zukan*, p. 566.

are lumped together in Japanese as *magusotake*, "horse-manure mushrooms") and to *Pholiota spectabilis* in the case of *ô-waraitake*. Kawamura also noted that while we cannot guess which of these two the *maitake* of the *Konjaku* tale might be, it is probable that they were one or the other.⁸

Japanese reports of *Pholiota spectabilis* as a toxic species have caused some puzzlement to Roger Heim, who in his *Les Champignons Toxiques et Hallucinogènes* wonders that among the reported toxic species in Japan is ". . . *Pholiota spectabilis*, observation curieuse puisqu'elle s'applique à une espèce propre en même temps à l'Europe où elle se montre parfaitement inoffensive or, il est certain que la forme japonaise — appelée *ô-waraitake* — ressemble en tous points à la *Pholiota* européenne."⁹ Nonetheless, Kawamura's book relates several cases of *Pholiota* poisoning, and Imazeki and Hongo in *Genshoku Nihon Kinrui zukan* (Colored Illustrations of Fungi of Japan) also cite *Pholiota spectabilis* as intoxicating (though under the name *Gymnopilus spectabilis*) and say, "The toxic characteristics of this mushroom are not fatal but it produces an abnormal stimulation of the nervous system. The victim of the poison becomes excited and is said to dance and sing and laugh as though crazy."¹⁰

Kawamura supports his claim with several cases in which he was able to verify that the mushrooms responsible for producing "*waraitake* intoxications" were in fact *Pholiota spectabilis*. Of one of these cases he gives the following detailed report:

On July 7, 1922, in Hōsen village of Nitta country in Gumma prefecture one Ouchi Gensaburō (age 20) found a clump of mushrooms growing on a stump. He

picked them and ate them that evening, after which he became intoxicated and broke out in laughter. His hands and feet moved continuously as though he were dancing and he walked in zigzags like someone who had drunk too much *sake*. The same sort of drunkenness had occurred the previous year but at that time it was much lighter and no attention had been paid to it. This time, however, after he had eaten mushrooms from the same stump, this normally reticent youth suddenly began to chatter in broken sentences and to dance about. When the poisoning became very evident he went to one Dr. Aragi for help. The patient quickly recovered and was completely normal by the next day. Samples of the mushroom were sent to Dr. Kawamura and proved to be specimens of *Pholiota spectabilis*.¹¹

Kawamura reports other similar cases involving *Pholiota spectabilis*, including one in 1930 when he again received identifiable specimens. In several of these cases the mushrooms had been cooked in soup, which treatment apparently eliminated their bitter taste though not their toxic potency.¹² This might go some way toward explaining why the mushrooms are known as toxic in Japan but not in Europe. For, usually, raw *Pholiota spectabilis* is quite unpleasant to the taste, and it would probably be hard for most people, intentionally or not, to choke down enough to produce any effect. This supposition is to some extent supported by a recent case in Massachusetts. A few summers ago, some local mushroom fans gathered a number of specimens of *Pholiota spectabilis* and, though they should have known better, ate them in a sauce over steak. A short time later, they suffered fits of giggling and hilarity that seemed funny until the realization that they were suffering from some kind of mushroom poisoning, the final determination of which they could not predict, hit them and the hilarity gave way to two or three hours of severe anxiety. After

⁸ *Ibid.*, pp. 548–551.

⁹ Roger Heim, *Les Champignons Toxiques et Hallucinogènes*, p. 41.

¹⁰ Imazeki and Hongo, *Genshoku Nihon kinrui zukan*, pp. 73–74.

¹¹ Kawamura, *op. cit.*, p. 549.

¹² *Ibid.*, pp. 549–551.

the fact, when they were asked how they had managed to eat anything so bitter, their explanation was that the steaks were prime meat and very thick and they just could not see wasting them. In this case, too, cooking may have rendered the mushrooms somewhat more palatable with minimal loss in toxicity. Another possibility might be that we have two or more subspecies of *Pholiota spectabilis* which vary in taste and toxic potency, or perhaps different growing conditions may have some effect. Such suppositions would help explain Heim's distrust of the Japanese reports. In any case, it is clear that in both Japan and the United States some *Pholiota spectabilis* have produced obvious psychophysiological symptoms.

Conclusions Regarding the *Konjaku* Tale

There are two likely conclusions to be drawn from this little study.

1. The *maitake* story in the *Konjaku monogatari* is probably a relatively straight re-telling of a case of mushroom intoxication, dating from about 1000 A.D.

2. The mushrooms involved were probably either *Panaeolus papilionaceus* or *Pholiota spectabilis*.¹³

¹³ Imazeki and Hongo, *op. cit.*, pp. 59-60, add one more possibility to our list of psycho-active mushrooms in Japan. They identify *waraitake* as *Panaeolus papilionaceus* (p. 56) and *ô-waraitake* as *Gymnopilus spectabilis* (i.e., *Pholiota spectabilis*) (pp. 73-74). However, they also mention still another mushroom *Psilocybe venenata* (*Stropharia venenata* or *Stropharia caerulescens*) which "if eaten by mistake produces unusual symptoms of toxicity that manifest themselves as a condition of frenzy and an unusual nervous excitement like that brought on by *waraitake*" (p. 60). This mushroom has the common names of *waraitakemodoki* ("false-waraitake") or *shibiretake* ("numbing mushroom"). Unfortunately, I am unable to find any other evidence about the toxicity of this species.

APPENDICES

I. Other Chinese and Japanese Mentions of "Laughing Mushrooms"

Research on the *Konjaku* tale led me to several other literary or semi-literary notations of "laughing" or "dancing" mushrooms. The Chinese work of the Sung period, the *Pi-shu lu-hua* ("Records of Summering Out of the Heat") by the compiler Yeh Meng-te (1077-1148) tells the following tale.

The valleys of Wen-tai about Mount Ssu-ming¹⁴ produce many mushrooms. However they are not all alike and some of those that are eaten prove to be poisonous. It is said that there was a Buddhist priest who taught [that when people ate such mushrooms if they would] dig up some dirt and mix it with cold water until it became muddy and then, after waiting a bit, drink the mixture, they would be restored to perfect health. I have seen this recipe myself. In the pharmacopeia of the hermit T'ao¹⁵ it is noted that this is called an "earth infusion" and that it will cure the effects of the maple-tree mushroom,¹⁶ which when eaten causes one to laugh uncontrollably and which is therefore known as the laughing fungus.¹⁷

The "Laughing fungus" also receives a mention, though a very brief one, in

¹⁴ Possibly wen-tai (warm terraces) is not a place name and the passage should read, "In the warm spots of the valleys about Mount Ssu-ming. . . ." In any case, Ssu-ming Shan itself is a famous mountain in the southwestern part of the Chekiang province of China that has close connections with the T'ien T'ai sect of Buddhism. *Daiziten*, vol. 13, p. 267.

¹⁵ The Hermit T'ao is T'ao Hung-ching (A.D. 451-536), who spent a good part of his life seeking the Taoist medicine of immortality. Cloistered in his mountain retreat far from the distractions of mundane matters he produced the famous Chinese pharmacopeia, the *Ming yi pieh lu*. Herbert A. Giles, *A Chinese Biographical Dictionary*, pp. 718-719.

¹⁶ I have no specific identification to offer for the "maple-tree" mushroom. Probably it is a general term.

¹⁷ Yeh Meng-te. *Pi-shu lu-hua*. pp. 722-723. Here as in the other Chinese sources the character *chün* was used for "mushroom" rather than *jung*, the Chinese equivalent of the Japanese word *take*.

the *Wu tsa tsu* (Five-fold Miscellany) of 1619, which, after listing a number of mushrooms, notes: "There is also the 'laughing fungus'; those who eat it laugh uncontrollably."¹⁸

Perhaps the most intrinsically interesting literary mention of these mushrooms that I ran across was in the *Ukiyoburo* (The Worldly Bathhouse), a Japanese comic novel of the Tokugawa era (pub. 1809–1813). In this story, the "hero" Kechi (Skinflint) uses some *maitake* as the base for a special soup which he gives to a fellow called Nigakurō, because Nigakurō "is quite a poisonous character" who never talks or laughs. Nigakurō eats the soup as a side dish to some rice wine and finally comes to the local public bathhouse where Kechi and some cohorts await him. At first he is his usual stolid self, but soon his hands begin to dance by themselves, then even his feet. "Even though I don't want to dance, weirdly enough . . . oh, oh, oh . . .," he complains. At this point, a low-class entertainer — a sort of one-man band who imitates various instruments with his mouth — comes in and begins to call out drum rhythms. By the end of the scene, the usually satiric Nigakurō has turned from a dour clod into a one-man "crazy show" (*Kyōgen*).¹⁹

The *Ukiyoburo* incident (here given only in bare outline) is very interestingly told, but it is almost certainly a derivative of the *Konjaku* tale. The sentence quoted above "even though I don't want to dance, weirdly enough . . . oh, oh, oh . . .," looks very much like a lift from the *Konjaku's* "Even as we were thinking 'How strange!' strangely enough we. . . ." Also, when Kechi first gets the *maitake*, he mentions that there are tales of such mushrooms in "the *Ujishui* and other ancient books." The *Ujishui monogatari* is a

folk collection closely related to the *Konjaku* and often confused with it. Even the use of *maitake* "dancing mushroom" rather than the more common term *waraitake* "laughing mushroom" is a bit suspicious. Thus, in spite of its interest, the *Ukiyoburo* version is probably purely literary and can add nothing factual to our knowledge of the "laughing" and "dancing" mushrooms.

II. Some addenda on *Panaeolus papilionaceus*

While the toxicity of *Pholiota spectabilis* has been doubted by some, the toxic qualities of *Panaeolus papilionaceus* and its close relatives have been recognized in many parts of the world. In at least one case they seem to have been used ritually, for in a recent article Robert Graves recalls, "A few years ago, having learned that certain Portuguese witches were using another variety of mushroom for magical enchantments, I arranged to have an example sent to the great mycologist, my friend Dr. Roger Heim, director of the Musée de L'Homme at Paris. It proved, so far as I recall, to have been *Panaeolus papilionaceus*."²⁰

Panaeolus intoxication is not unknown in the United States either. A rather well known mycologist in the Boston area has seen *Panaeolus papilionaceus* deliberately gathered in both Maine and Louisiana. Interestingly enough, in the case of New England, it was thrifty farmers taking advantage of an opportunity to get "drunk for nothing," while in Louisiana the gatherers were rather more modern sophistates looking for a psychedelic thrill. Indeed, the best (though not too-readily available) description of *Panaeolus* intoxication that I found is based on a case that occurred in Maine as early as 1914. It is herewith appended almost

¹⁸ Hsieh Chao-shua. *Wu tsa tsu*, vol. 2, p. 91.

¹⁹ *Ukiyoburo*. pp. 305–306.

²⁰ Robert Graves. "The Divine Rite of Mushrooms," p. 110.

in toto as it was recorded by A. E. Verrill of Yale University, in the "Discussion and Correspondence" section of the journal *Science*.

Mr. W., whose narrative is here given, is a middle-aged, vigorous man, strictly temperate in his habits. He is a good botanist, and has made a special study of fungi. The account of his experience was dictated to me by him about a week after the event, while fresh is his memory. . . .

Narrative of Mr. W.

On July 10, 1914, I gathered a good mess of the mushrooms (*Panaeolus papilionaceus*) and had them cooked for dinner. There may have been about a pound of them as gathered, but when fried in butter they made no great quantity, owing to their softness and delicate structure.

They were all eaten by Mrs. Y. and myself. Peculiar symptoms were perceived in a very short time. Noticed first that I could not collect my thoughts easily, when addressed, nor answer readily. Could not will to arise promptly. Walked a short distance; the time was short, but seemed long drawn out; could walk straight but seemed drowsy; had no disagreeable stomach sensations, effects seemed entirely mental; remember little about the walk. Mrs. Y. was in about the same condition, according to Mr. Y. My mind very soon appeared to clear up somewhat and things began to seem funny and rather like intoxication. Walked with Mr. Y. A little later objects took on peculiar bright colors. A field of redbud grass seemed to lie in horizontal stripes of bright red and green, and a peculiar green haze spread itself over all the landscape. At this time Mrs. Y. saw nearly everything green but the sky was blue; her white handkerchief appeared green to her; and the tips of her fingers seemed to be like the heads of snakes.

Next, say about half an hour after eating, both of us had an irresistible impulse to run and jump, which we did freely. I did not stagger, but all my motions seemed to be mechanical or automatic, and my muscles did not properly nor fully obey my will. Soon both of us became very hilarious, with an irresistible impulse to laugh and joke immoderately, and almost hysterically at times. The laughing could be controlled only with great difficulty; at the same time we were indulging extravagantly in joking and what seemed to us

funny or witty remarks. Mr. Y., who was with us, said that some of the jokes were successful; others not so, but I can not remember what they were about.

Mr. Y. says that at this time the pupils of our eyes were very much dilated, and that Mrs. Y. at times rolled up her eyes and had some facial contortions, and slight frothing of saliva at the mouth. Later we returned to the house, about one quarter of a mile. At this time I had no distinct comprehension of time; a very short time seemed long drawn out, and a longer time seemed very short; the same as to distances walked; though not so when estimated by the eye. The hilarious condition continued, but no visual illusions occurred at this time.

After entering the house, I noticed that the irregular figures on the wall-paper seemed to have creepy and crawling motions, contracting and expanding continually, though not changing their forms; finally they began to project from the wall and grew out toward me from it with uncanny motions.

About this time I noticed a bouquet of large red roses, all of one kind, on the table and another on the secretary; then at once the room seemed to become filled with roses of various red colors and of all sizes, in great bunches, wreaths and chains, and with regular banks of them, all around me, but mixed with some green foliage, as in the real bouquets. This beautiful illusion lasted only a short time. About this time I had a decided rush of blood to my head, with marked congestion, which caused me to lie down. I then had a very disagreeable illusion. Innumerable human faces, of all sorts and sizes, but all hideous, seemed to fill the room and to extend off in multitudes to interminable distances, while many were close to me on all sides. They were all grimacing rapidly and horribly and undergoing contortions, all the time growing more and more hideous. Some were upside down.

The faces appeared in all sorts of bright and even intense colors — so intense that I could only liken them to flames of fire, in red, purple, green and yellow colors, like fireworks.

At this time I began to become alarmed and sent for the doctor, but he did nothing, for the effects were wearing off when he came. Real objects at this time appeared in their true forms, but if colored they assumed far more intense or vivid colors than natural; dull red becoming

brilliant red, etc. A little later, when standing up, I had the unpleasant sensation of having my body elongate upward to the ceiling, which receded. I grew far up, like Jack's bean-stalk, but retained my natural thickness. Collapsed suddenly to my natural height.

At this time I noticed the parlor organ and tried to play on it, to see the effect, but could not concentrate my mind nor manage my fingers. About this time my mind became confused and my remembrance of what happened next is dim and chaotic. Probably there was a partial and brief loss of consciousness. Lay down to wait for the doctor. Looking at my hands, they seemed to become small, emaciated, shrunken and bony, like those of a mummy. Mrs. Y. says that at this time her hands seemed to grow unnaturally large.

When I attempted to scratch a spot on my neck, it felt like scratching a rough cloth meal-bag full of meal, and it seemed as large as a barrel, and the scratching seemed quite impersonal. Later I imagined I was able, by a sort of clairvoyance, to tell the thoughts of those around me. Soon after this our conditions rapidly assumed the very hilarious phase, similar to that of the early stages with much involuntary laughing and joking. This condition gradually diminished after three o'clock, until our mental conditions became perfectly normal, at about six o'clock P.M. The entire experience lasted about six hours. No ill effects followed. There was no headache, nor any disturbance of the digestion.²¹

²¹ A. E. Verrill. In *Science*, vol. 40, no. 1029, pp. 408-410. It has been pointed out to me that Verrill's identification may not be one hundred percent trustworthy since it is hard to distinguish *Panaeolus papilionaceus* from other species of the genus and since a careless investigator might even confuse some species of *Psilocybe* with *Panaeolus*. And I must admit that the symptoms described by Verrill do seem

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to exceed those reported by the Japanese sources. But this might reflect either more complete reporting or larger "dosage." Also, the uncontrollable urge to run and jump and to talk disjointedly mentioned by Verrill seems in close consonance with the Japanese descriptions. At any rate, barring *specific* reasons to disbelieve Verrill's report, I tend to accept the identification.



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Kava—Polynesian Beverage Shrub

The potent alkaloidal content of this plant has long made it an important intoxicating ceremonial plant of the Pacific islands and accounts for the minor commercial significance attached to it today.

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Introduction

Piper methysticum is definitely one of the more important economic plants of Polynesia. Under the names "kava", "ava", "awa", "yanggona" and "hoi" this shrub finds wide use because of its mild narcotic properties. Primarily it serves as a ceremonial and social drink but is also widely recognized by natives for its application in medicine as a diuretic and soporific, and, especially in former times, as an aid for relaxing into hypnosis.

This article tries to draw together some of the rather diffuse literature on the plant. In some ways this is not an easy task. It has been anthropologists, not botanists, who have written most on this subject, primarily because it occupies quite an important place in Polynesian culture. As can be seen from the bibliography, historians travelling in the Pacific in the last century have contributed much to our knowledge of early cultivation and uses of *Piper methysticum*, but their mention of it is often brief and in many cases published in old periodicals or books which are not readily available.

Although this article does not take up ethnological considerations, it should be realized that such matters are important in studying the use of any plant in "primitive" society. This article dwells specifically on planting and cultivation, on varieties as distinguished by the Polynesians, and on what information it

has been possible to gather regarding the marketing of kava as a commercial product.

Varieties and Distribution of Kava

First, it might be well to have a description of *Piper methysticum*. From Brown (1935) we read that this is a "Shrub $2 \pm$ meters in height, the cultivated varieties $4+$ meters high; leaves orbicular-ovate, abruptly acuminate, deeply cordate at the base, from 13 cm in length, 11 cm wide, up to 20 cm long and 18 cm wide in the Marquesan species, glabrous on both faces with the exception of minutely puberulent veins; veins 11–13, the three central ones reaching the apex; the petiole glabrous, $2.5 \pm$ cm in length; spike opposite the leaves; flowers monosporangiate, dioecious, the male spikes much shorter than the leaves, the floral bracts rounded, subcrenate, pelately attached at the center, with a puberulent pedicel; stamens two, the anthers subglobose, shorter than the filaments".

This species is apparently indigenous further west than Fiji, undoubtedly carried east by early migrants in the Pacific. The wild source is not known, but the plant is now in New Guinea and many islands of Polynesia and Micronesia. Forster mentioned no type specimen but wrote of localities in Tahiti, and the Tongan and Hawaiian Groups. The plant is in Fiji only as a result of cultivation (Smith, A. C., 1943).

It is cultivated in the Marquesas (kava or 'ava), in Tahiti (kava or hoi), Rarotonga (kava) (Brown, 1935), in Hawaii (Handy, 1940) and in the Fijian, Samoan and Tongan Groups. Kava used to be grown in Tubuai, but the missionaries came in 1882 and forbade the drink. Now only a few plants are left there (Aitken, 1930). The Easter islanders do not cultivate kava, even though it is used in Mangareva and in the Marquesas, which compose the probable original home of these people. Perhaps the climate of Easter Island is not favourable. This reason, however, cannot explain why kava is not cultivated on Rapa where the climate is favourable (Métraux, 1940).

Safford (1905) wrote that the plant was not cultivated in Guam, and Guppy (1887) said that he saw no kava-drinking in the Solomon Islands. Guppy mentions Rev. Lawes' statement that the plant grows wild on the south coast of New Guinea, but with no reference as to whether it was used.

Loeb (1926) mentions that not much is known of kava-drinking in Niue. It has evidently not become a common custom. Family records describe its use by chiefs in faikava-atua (offering to gods), but only one legend has kava playing a prominent part. Before kava was introduced, coconut water was drunk ceremonially with a libation poured out for the gods, as is done with kava in Samoa.

There are at least three references on the varieties of kava distinguished by the Polynesians in Hawaii and Marquesas and by the Poly-melanesians of Fiji. There are no doubt more descriptions of varieties in literature I have not yet found. Brown (1935) lists 21 varieties from the Marquesas, and includes short descriptions of some of them. It will perhaps suffice here to give a few notes on some of these:

Kava papapapa: regarded as one of the best beverage varieties; about

two meters in height; internally the root is yellowish, outside it is rather green; the internodes are short, the leaf blades thin and large; the spikes quite long.

Kava puou: used for kava; internodes comparatively long and tend to reddish-brown.

Kava veaoha: considered an excellent variety for making kava.

'Ava puou: an excellent variety for making kava; the root is quite tender, facilitating chewing; large variety, growing up to four meters; reddish-brown long internodes.

'Ava putea: used for kava; internodes vary in length and are of a light colour.

Kava putoake: informants state that this is the only variety which is used for medicine and for drink; it has a very powerful effect.

Parham (1935) lists and describes five Fijian varieties, three white types and two black types:

White varieties—Kasa Leka, Kasa Balavu and Qolobi.

Black varieties—Kasa Leka and Kasa Balavu.

The main distinguishing features are habit, length of internode and size of leaf scar.

Kava in Myth and Legend

Kava enters into many Polynesian myths and legends, a few relating to the plant's origin. In Tonga there is a specific story about the first appearance of kava:

There lived a chief by the name of Loau, from Haamea, Tongatapu, and one day Loau sailed to the small island Euaiiki to visit his attendant Fevanga. But this was a time of famine, and Fevanga was at a loss as to what to feed the visiting chief. There was a kape plant (*Arum costatum*) but it would not provide sufficient food. Finally Favanga and his wife Fefafa killed and cooked

their leprous daughter to be served with the kape—this was the only food they had for their chief. Loau recognized the human flesh at the meal and told the people not to eat it—it should be planted in the ground and brought to him when

Now when Fevanga took the kava to Loau it became custom to take a relish, sugar cane, with the kava drink (Gifford, 1924).

Tradition has it in Hawaii that kava was first brought in by Oilikukaheana

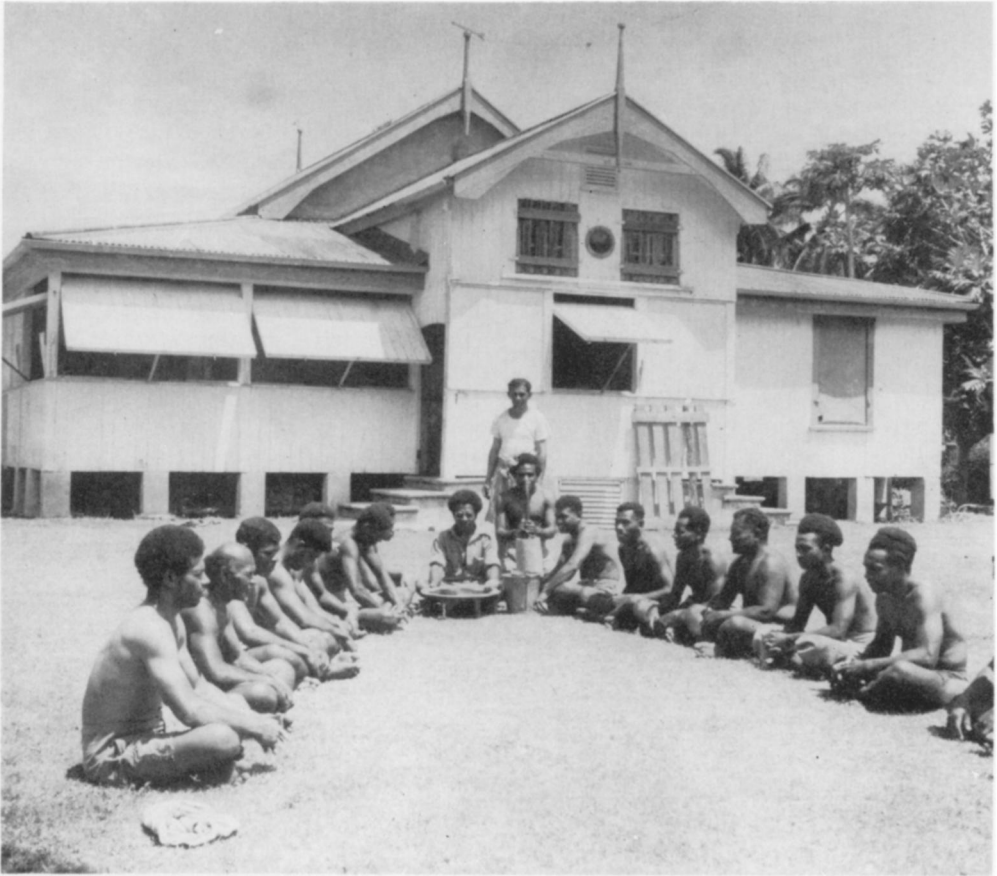


FIG. 1. A kava-drinking ceremony on the island of Munia, Fiji. The dried root is ground up, mixed with water, strained and then served from the large central bowl. With one cup of a coconut half-shell, each guest is served in turn, in order of social standing and with a flourish of presentation that includes chanting and sometimes dancing. Tradition dictates that each guest must finish his drink in one gulp.

it matured into a plant. Fevanga did this and the body grew up into kava and sugar cane, each plant arising from a different part of the body. And when it matured he noticed that a rat chewed on the kava and became paralysed, and then ate some sugar cane and revived.

who sailed up from Tahiti (Kahiki). It was said to be first planted on the island of Kauai. Oilikukaheana brought it to the Hawaiian Islands for a fishing plant. When he landed at Kauai he met and married the beautiful Kamaile who from that time onwards looked after the

plants. After a while, however, she threw out the plants, and at a later date they were found by Moikeha who asked Oilikukaheana about the name of the plant, and he was told that the name was Pahoei. When the plants were large Moikeha gave some to Ewa, and she determined to find out whether the plant was useful. When Ewa tried the plant and became intoxicated, it received the name "awa", and from then on it was called the "awa of Kaumakaeha" (Fornander, 1913-1920).

These stories might be taken as representative; they give us some idea that kava is important enough to the Polynesians to take a place in the historical stories, legends and myths of the people.

Planting and Cultivation

Traditionally, in Fiji, kava bushes are very carefully tended in small gardens often kept near the home. Nursery beds are maintained to receive the kasa (sections of mature stems bearing nodes) which are transplanted when they have grown up a few inches.

In commercial production, however, it is common practice to place the kasa in little hills, covering them with dry grass or leaves and letting them grow without transplanting. Transplanting from nursery beds is carried out by only a few of the Indian planters.

Concerning the requirements of the crop, it is important to note that rich soil and good drainage are rather necessary. The planting site might best be on new land, and a well drained hillside is often chosen. In Fiji the dark heavily vegetated soils are usually excellent for bearing a good crop; the common red latiritic soils prove quite unsatisfactory. Land which has born a previous crop is not likely to bring high yields. In many cases kava has been planted on land which was previously set in bananas or a first crop of kava, but for satisfactory yields this should not be done without

leaving the land fallow for three years or more.

After clearing of cover it is customary to plough or dig with forks and lay two or three sets of kava in each of the hills which are built up at six foot intervals. Persistent cultivation is needed until the plants are about three and a half years old; from that time they are left alone until harvested. Taro may be interplanted the first year of kava growth for full utilization of the land and quick cash return (Parham, 1935).

E. S. Craighill Handy (1940) gives us rather a good account* of the planting and cultivation of awa in Hawaii: "Awa should be planted on large tracts of land in warm localities, beside streams, at the edge of woods, on slopes where kukae puaa grass flourishes or where the ama'u fern grows, or in rainy localities. Awa, wauke, and upland taro grow well in the same localities and under the same conditions".

"Awa is planted much like sugar cane, by means of sections of the stalk, from whose joints grow the sprouts of 'eyes' (maka). The planter carries to the place selected the stalks of the variety desired, and there cuts them into short sections, being careful not to break off the 'eyes'. The sections later to be planted he lays in a trench filled with mud, leaving them to sprout there, while he clears his ground and leaves the grass and weeds on the soil to rot. When the segments in the trench have sprouted, he removes them and plants them in shallow trenches".

"A new plantation would require from two to three years before its pu awa were large enough to use; but once a plantation was growing, its roots would continue to grow and send up new stalks. In other words, the awa plantation never required replanting . . .".

Emerson (1903) wrote an interesting

* Account based on Kamakau, S. M., Extracts from Kuokoa, weekly newspaper in Hawaiian (translated by T. G. Thrum). Ms. in the B. P. Bishop Museum, Honolulu.

couple of paragraphs on awa growing in Hawaii where he mentions the people in hills rather than trenches, and points out that the roots may increase greatly in size and improve in quality over a considerable number of years: "... In planting it there is scant digging. Joints are set in the ground in somewhat the same manner as natives plant their hillocks of sugar-cane. After a time it is hilled, humus and leaves being used, and after this single hilling it is generally left to grow without further care. It will thus continue to grow on for an indefinite time, spreading its roots abroad, to be dug at the convenience of the consumer".

"It is said that age does not impair the vitality or vitiate the quality of the root, but rather enhances its value. Roots thus left in the ground for twenty years or more will reach an enormous size, one root is sometimes large enough to be divided into loads for two or three men".

A. M. Hocart (1929), in his ethnological study of the Lau Islands (Fiji), wrote that in that area kava is propagated by slips (lower joints with a bud on each) and that the plants are sometimes grown over a flat stone so that much of the root system grows upwards, the bush holding by small roots which grow over the stone and into the ground.

Fornander (1913-1920) also describes the use of a stone in planting but says this is to hold the joints down until roots form: "It is said that the awa is propagated from the joints, that is the branches; it is pressed down and weighted with a stone until the roots develop; then it is taken to where it is desired to be planted. Again, when the awa roots are being dug up, that is, when it is being pulled, the branches are chopped up and thrown back into the holes from which the roots have been taken, then covered over the soil, and when the sprouts appear, called Nihopuaa, they are taken and planted. The method of planting I have seen is the same as that followed in the planting of cane".

E. and P. Beaglehole (1941) consider that it takes little trouble to plant and cultivate kava. Presumably from native informants, they have found that in this region of their study—Pangai village, Vava'u Group, Tonga—March appears to be the best month for planting. This is done by six men of the village every two to three years, laying out 20-50 cuttings each time. The varieties the Tongans use there are ready for pulling after two or three years.

Planting in trenches seems to be quite an old custom, for James Wilson (1799) wrote at an early date with mention of trench planting in the Society Islands: "The plots of awa ground were laid out in such nice order; each bed formed regular parallelograms, trenched two feet deep, and disposed with a great degree of taste; the whole enclosed with a fence of bamboo".

Effect of the Narcotic

The effect of kava as a narcotic drink is often exaggerated by some authors. Statements such as "Delightful dreams charm this torpor" or statements emphasizing addiction to this drug are highly inaccurate. For one of the best descriptions of the effect of the drink, we might turn to A. M. Hocart (1929): "The intoxication dulls the countenance. As I experienced it, it gives a pleasant, warm, and cheerful, but lazy feeling, sociable though not hilarious or loquacious; the reason is not obscured. In time a certain dullness settles on the company in which the kava and the late hour probably both have a part. Once after drinking I felt miserable and found it difficult to walk straight; on turning into bed, I felt sick and could not get to sleep. Such intoxication is rare because in Lau the kava is so diluted and served in such small cups that many rounds can be drunk with impunity. Habitual drinkers are said to become intoxicated more quickly than occasional ones. Kava has no unpleasant reaction next morning,

other than indolence and lack of appetite. Habitual drinkers can be noted by their watery and bleary eyes, their dull skins, which in bad cases become scaly”.

Tongans of Pangai village regard the beverage as beneficial for healthy people but detrimental to those who are sick. They are generally moderate in their drinking, saying that an addict becomes weak and lazy and has domestic trouble due to negligence of responsibilities (Beaglehole, 1941).

There is no doubt that green kava (that which is not completely dried) is much stronger than well dried kava. The colour of a kava drink may be anything from white to beige, sometimes with a greenish tinge, and the taste may be neutral, insipid or rather bitter. George Forster (1777) wrote about the drink “which is then whitish, insipid, or partaking somewhat of the taste of a weak infusion of pepper”. I personally would not compare the taste to that of a peppery infusion, but this is not an important point.

Even though ceremonial and social drinking is by far the greatest use of kava, it found its way into many other phases of Polynesian life. It was much used in medicine, as a diuretic and for rheumatism and asthma, and as a poultice for headaches; and was even believed to cause perspiration—to break a cold or fever—when placed under a person lying down (Handy, 1940).

The Hawaiians were very much aware of kava's somnifacient qualities. It has been used by all classes of them for this purpose—inducing relaxation. Handy has it from Mrs. Pukui that, contrary to some opinions, kava was not tabu to the lower classes. The difference seems to lie in the fact that the alii (noble class) drank socially and for pleasure, the kahuna (priest class) ceremoniously, the working people for relaxation. Kava was not in short supply. Some particular varieties were retained for special uses, as some of the darker varieties for

ceremonial use. Oftentimes when used in medicine, certain varieties were specified as most effective.

As a ceremonial gift, kava was offered to ancestral spirits on the domestic altar and offered to such supernaturals as the shark patron. It was at times offered to a spirit through a medium who drank it for the spirit, and it was often served to seers who gazed into it and drank it to “induce the desired passivity or trance”. In this way, kava may be considered something of an hypnotic (Handy, 1940).

Kava was also used in western Polynesia to induce a removed state of mind (Frazer, 1892). In Uea Island, which is culturally similar to Samoa, kava was deliberately drunk to bring forth inspiration (Handy, 1927), as was done on Niue (Thomson, 1902). In Hawaii, also, psychic diagnosticians used kava “to strengthen the spirits” (Fornander, 1913–1920, vol. 6), and there is record of this practice in the Marquesas (Handy, 1927).

Commercial Considerations

Lack of data permit only brief and very inadequate comments on the commercial significance of kava. B. E. V. Parham, Senior Agricultural Officer and botanist in the Fiji Islands, is possibly the only author who has written on the economic aspects of the crop. Writing from Suva (Fiji), in 1935, he states that commercial production in that area is usually handled by Indians on family plantations. Their initial outlay on a ten-acre holding was approximately as follows:

Payment to Fijian owners	£10–£20
Deposit (survey fees, etc.)	£10
Clearing at £3 per acre	£30
Rent at 10s. per acre	£5 per annum.

In four years the total cost of production would have been £100 with the initial outlay at £50–£60, rent coming to £20 and labour costs amounting to £30. This area should have grossed about £500–£600, with a profit of £400–£500 in four years on a ten-acre plantation.

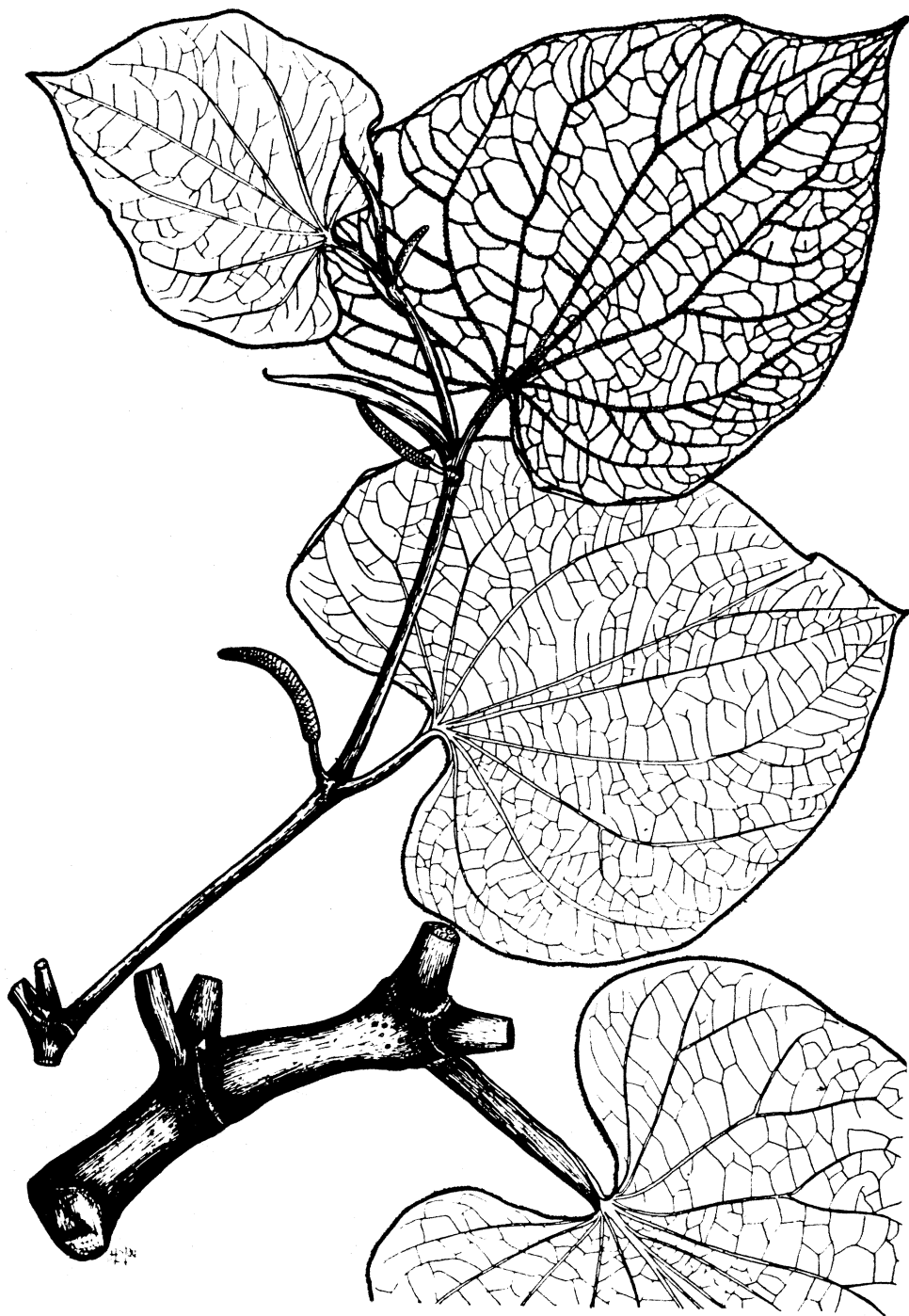


FIG. 2. Foliage and inflorescence of kava (*Piper methysticum*). (From Degener, *Flora Hawiainensis*).

Punjabis, who do not often take up permanent residence (they usually try to return to India after the harvest), make their way with minor crops until the kava is ready for sale. Often the buyer of a plantation will assist the planter with harvesting, and the vendor reciprocates by helping to plant the new crop.

From Kandavu (one of the large islands in the Fiji Group) the following figures have been recorded. Production cost per acre came to £30-£35 for a crop four years in the growing. Fair yields were estimated at 20-25 sacks per acre, the return at £93 per acre (140 # at 8d. per #, or £4: 13: 4d. per sack).

Often, when working with good soil, the total four-years production cost could be covered with a one-year crop of interplanted taro.

Parham has it on good authority that kava "in the field" was worth £60 per acre at the time (1935). Chinese planters have approximated that clearing one acre and planting it cost £15-£20.

Preparation for market is easy of description for it consists only of scraping and peeling the lower parts of the plant and placing them in the sun to dry.

The market, and it is only a local one, afforded a price of 6d.-9d./#. The fibrous roots bring a much lower price, quoted at 3d./#, and each plant bears up to 7 # of this inferior product. A fairly high yielding plant may provide 10 # of "Lewena" which is the best grade of kava generally recognized in Fiji. From 1933 to 1935 there was a great drop in price of "Wakana", the second grade roots. In 1933 20 # brought as much as 18/- but in 1935 could bring only 1/8d. Bark and scrapings could be marketed for a low price, and "Kasa", the peeled nodes of the stem, have been used in a mixture with ground-up pieces of the root.

Parham is of the belief that one reason for the low kava prices is that the purchasers will not pay high prices when they realize that many planters adulter-

ate their product with portions of diseased root (Parham, 1935).

It is commonly acknowledged, at least in Fiji and Samoa, that the white grades of kava are of definitely superior quality and are much preferred to the black types. Unfortunately, producers often would rather grow the black varieties because they mature earlier than the white, in two and one-half to three years as compared to three to four years. Then, too, it may be that the black varieties are more resistant to disease and thus find more favour with the planters of Fiji where the wilt disease has been quite a problem. The green roots, improperly dried, are not preferred for quality, for they may be quite nauseating, but they are considerably stronger and can have quite an effect on the drinker (Parham, 1935, and my own observations).

Ernest and Pearl Beaglehole (1941), in their anthropological study of a Tongan village, mention that natives there find that the usable portion of a kava plant amounts to 40 or 50 #. They, too, agree that green kava is quite strong, causing headaches and a "general malaise". Concerning local consumption, they state that each household uses about ten large roots a year, while an addict to the drink might struggle along on 30 to 40 large roots.

Missionaries have, of course, killed the potential kava market in many of the Pacific islands (Aitken, 1930; Handy, 1930; Degener, 1946), and in the mid-1800's the Hawaiian Government forbade this drink without a doctor's prescription; this law, however, was not effectively enforced. Even today it is sometimes possible to buy the kava root in the Hawaiian markets.

From 1885 to the beginning of World War I kava found its way into the export markets of Hawaii. This product, for medicinal use, was taken up primarily by Germany, but the value did

not exceed \$4000 and substitutes were soon found for this species of *Piper* (Degener, 1946).

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Nutmeg as a Narcotic

ANDREW T. WEIL¹

Introduction

In his search for varied experience and escape from everyday boredom, Man has found many substances of plant origin that poison the human organism but that, at the same time, cause pleasurable physical or mental changes. The word "narcotic" technically refers to a stupor-inducing drug, but it has been applied loosely to many of these deliberately consumed substances. Alcohol, opium, and morphine are narcotics in the strict sense; marihuana, peyote, and psilocybine in the broad sense.

According to Aldous Huxley (1), the ideal narcotic would be

... potent in minute doses and synthesizeable . . . less toxic than opium or cocaine, less likely to produce undesirable social consequences than alcohol or barbiturates, less inimical to heart and lungs than the tars and nicotine of cigarettes. And, on the positive side, it should produce changes in consciousness more interesting, more intrinsically valuable than mere sedation or dreaminess, delusions of omnipotence or release from inhibition.

Nothing available today meets all of these specifications. In using his narcotics, Man must tolerate a variety of drawbacks.

Nevertheless, narcotics are used regularly in nearly all parts of the world, and three observations about these practices are relevant to the present paper. First, Man, it seems, is willing to experiment with almost anything in his environment: such bizarre materials as airplane glue, morning-glory seeds, cinnamon, and spider webs have all been put to narcotic use. Second, persons who use narcotics are often willing to suffer extreme discomfort along with the pleasant effects produced by drugs.

Finally, individual reactions to narcotics are profoundly influenced by psychological

factors. William James and his friends in Boston after the Civil War found that they could enjoy transcendent insights by inhaling laughing gas. More recently, similar results after sniffing airplane glue have been experienced—an indulgence that does little more on its own than cause dizziness. Apparently, what some narcotic drugs do to the mind is slight compared to what the mind, given a chemical prod, may do on its own.

The use of nutmeg as a narcotic illustrates all three points: nutmeg is an obscure drug, causes many alarming symptoms, and brings about pleasant mental changes only in the proper psychological context. Yet the reason that nutmeg must be considered a narcotic is not only that it can induce stupor but that many persons now deliberately consume it to escape from reality.

Botanical, Historical, and Commercial Notes on *Myristica* Fragrans

Nutmeg and mace are both products of the nutmeg tree, *Myristica fragrans* Houtt. (Myristicaceae). The genus comprises about 100 species found throughout the tropics, especially in the Malayan region; but of these, *M. fragrans* alone contains enough of an aromatic essential oil to make it valuable for cultivation. Nutmeg is the dried seed of the plant; mace is the dried aril surrounding the shell enclosing the seed.

Many writers have commented on the beauty of the nutmeg tree. It grows usually to a height of 30 or 40 feet, though in its native lands—the Banda Islands and other islands of the East Indian archipelago—it often attains 60 feet, while in Penang it commonly remains a mere shrub (2). The bark is dark gray; the branches are spreading; the leaves are alternate, oblong-ovate, four inches long, leathery, and glossy green above. Normally, the species is dioecious. Flowers, male and female, are shaped like those of the lily-of-the-valley; they are pale yellow, fleshy, and have a strong scent of

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nutmeg. Male flowers are borne in cymes arising near the axils of leaves, but female flowers are either solitary or in groups of three (2). The fruit is a pendulous, fleshy drupe resembling an apricot in form and color (3):

When quite ripe, the fleshy husk opens by splitting from the top, along the groove, into two halves, nearly to the base. The husk or *pericarp* is of a somewhat firm texture and $\frac{1}{2}$ inch thick, rather acid in taste, with an aromatic flavour of nutmeg. Within the husk is the seed, the nutmeg of commerce, enclosed in a deep brown shining seedcoat, the *testa*, and over this lies a crimson network, the mace, which is an *arillus* or outgrowth from the base of the seed.

The mace is attached to the seed only at the base, and consists of narrow, irregular flaps that closely enwrap the entire testa. Within the shell is the oval nutmeg, usually just under an inch long, woody in texture, strongly aromatic, and oily.

The nutmeg tree requires a hot, humid climate. It is widely cultivated in the tropics, particularly on the Spice Islands (the Moluccas), around the Strait of Malacca, and in the Caribbean (notably on Grenada).

The ancient Greeks and Romans did not know nutmeg and mace (4), but it is likely that Arabian traders were importing *Myristica* from the East Indies by the first centuries A.D. No definite evidence of nutmeg's appearance in Europe occurs until the end of the 12th Century. In a poem dating from about 1195 and describing the entrance of Emperor Henry VI into Rome before his coronation, Petrus de Ebulo (5) mentions that the streets of the Eternal City were fumigated for the occasion with "*Myristica*" and other aromatics. Ridley (3) adds that both nutmeg and mace must have been well known in Europe by this time, "for it is recorded that about 1284, 1 lb. of mace cost 4s. 7d., the value then of three sheep, or half as much as a cow."

Nutmeg's true home remained undiscovered for some time. The traveler Masudi, during a visit to India in 916-920, noted (6) that nutmeg, clove sandalwood, and *Areca* came from the "eastern islands." Furthermore, on the way back from his great trip to China (1271-1295), Marco Polo visited the Malayan archipelago (the first Eu-

ropean to do so) and listed nutmeg as one of the area's resources (4). Yet, despite these clues, the source of nutmeg was not known in the West until the Portuguese reached Banda in 1512. Portugal controlled trade in nutmeg and mace from that year until the beginning of the 17th Century, when most of the Pacific spice-producing territories fell into the hands of the Dutch. (3).

In a ruthless campaign to keep prices extremely high, the Dutch tried to limit cultivation of the nutmeg tree to the islands of Banda and Amboina. But they were frustrated both by fruit pigeons that carried the seeds to other islands (3), and by the French, who introduced the tree into Mauritius in 1769 (7). The British East India Company, furthermore, sent a representative to the Moluccas in 1796 to collect spice plants, and with his help, nutmeg trees were growing in Penang a few years later (7). Breaking the Dutch monopoly brought prices of nutmeg and mace down to more reasonable levels.

The Spice Islands (now part of Indonesia) have continued to be a center of nutmeg production, along with Penang and other areas in the former British Crown Colony of the Straits Settlements (now part of the Federation of Malaysia). Although *M. fragrans* has been planted in many countries outside the Far East (including some in Africa and South America), its cultivation has been firmly established only in one other area: the West Indies. In 1802, nutmeg trees were smuggled from Cayenne in French Guiana to the British-held island of St. Vincent; thereafter, nutmeg growing spread throughout the Antilles, reaching Grenada, for example, in 1843 (4).

The nutmeg tree is slow-growing, taking 15 years to produce full yields. The fruits mature six months after the flowers fall and are fully ripe when the pericarp splits, revealing the mace-enclosed testa. Exceptional trees may yield more than 10,000 nuts a year; in general, a good tree yields 1500-2000 annually—a weight of ten pounds of nutmeg to one of the mace (4).

The nut, with its mace, is removed from the husk; the aril is then detached from the seed either by hand or with a knife. Fresh arils are brilliant red and leathery, with a

strong flavor of turpentine. The mace may be kept in one piece ("double-blade") or separated into two halves ("single-blade"), before it is flattened by hand or between boards. It is then dried thoroughly in the sun or by artificial heat during which process it gradually turns orange, then orange-yellow and acquires its characteristic aroma. Dried mace is packed in teak casks (4).

The nutmegs, usually in their shells, are likewise dried, frequently over a smouldering fire. When completely dry, the seed rattles in the testa. Some nutmegs are exported at this stage. More commonly, the seed is removed after the shell is cracked with a wooden mallet or in a special machine. Sometimes, shelled nutmegs are treated with lime before shipping to protect them from insects. They are then sorted by size and packed (3). For the spice trade, nutmegs are valued according to size, smoothness, light color, and freedom from adulteration with wild seeds.

"Banda mace" is the trade name given to the aril is *M. fragrans*, regardless of where it is grown (3):

As met with in commerce it is pale orange-brown or brownish yellow, flattened, $1\frac{1}{2}$ to $1\frac{3}{4}$ in. long, $\frac{3}{4}$ to 1 in. wide, the forked segments having rounded axils. The tips are usually folded over into a kind of cap. The surface is dull. The flavour like that of nutmeg, but distinct, but there is no acidity.

The finest mace and the finest nutmegs come from Penang, and, in general, the East Indian spices are preferred to the West Indian.

Whole mace is never found in retail stores—only the ground spice is available. Whole nutmegs are much less common than they once were. Not too long ago, the nutmeg-grater was a familiar kitchen item; today, most housewives use ground nutmeg. In the United States, nutmeg and, especially, mace are relatively expensive compared with other popular spices: a $2\frac{3}{4}$ ounce jar of whole nutmegs (about 15 nuts) sells for \$1.25; a $3\frac{1}{8}$ ounce jar of East Indian ground mace costs \$1.50 (8).

Products of *Myristica*: Their Uses and Composition

Nutmeg husks. The pericarp of the nutmeg fruit may be preserved in sugar while

unripe, salted and dried as a condiment, or made into jellies. All of these preparations have the flavor of nutmeg, and all are reported to be delicious. But they are virtually unknown outside the regions in which the nutmeg tree is grown (3, 4).

Nutmeg. Ground nutmeg, a granular orange-brown powder with characteristic aroma, is a familiar kitchen spice (9):

It has an aromatic odor and a warm, aromatic, slightly bitter taste. Used in custards, puddings, pumpkins and fruit pies, also gives a delicate flavor to cabbage and as a sprinkling on "egg nog," cauliflower and spinach.

In the past, nutmeg has had wide applications in medicine (see below).

Whole nutmeg, depending on the variety, contains from 5 to 15 per cent of a volatile oil which accounts entirely for the aroma and flavor of the spice. Ground nutmeg is subject to rather rapid losses of this component. In addition, dried nutmegs contain 25 to 40 per cent of fixed oil and 5 to 15 per cent ashes. The remainder is moisture, fiber and starch (7):

The U. S. Definitions and Standards for Food Products require nutmegs to contain not less than 25 per cent of non-volatile ether-soluble extractive matter, not more than 10 per cent of crude fibre, not more than 5 per cent of total ash, nor more than 0.5 per cent of ash insoluble in hydrochloric acid.

Mace: Mace, though not quite so well known in the kitchen as nutmeg, is nevertheless a popular spice. It is a brownish yellow or brownish orange, granular powder with a strong aroma resembling closely but by no means identical to that of nutmeg (11):

Mace is more favoured for use with savoury dishes, and is employed in the manufacture of pickles, tomato ketchup, etc. In suitable combinations it gives an agreeable smoothness to the flavour. Mace is also especially good in fish pasties, sauces for fish, etc.

In addition, it is used in "pastries, cookies and baked goods, preserves; and adds a delicious flavor to oyster stew and baked fish" (11). Good cooks sometimes add mace to cherry pie and maintain that it is indispensable in making pound cake. Like nutmeg, mace has been used in medicine.

Whole mace contains from 4 to 14 per cent of a volatile oil very similar to that found in nutmegs (10, Vol. V), along with moisture, fat, starch, etc. (7).

The U. S. Definitions and Standards for Food products require mace to contain not less than 20 per cent nor more than 30 per cent of non-volatile ether-soluble extractive matter, not more than 10 per cent of crude fibre, not more than 3 per cent of total ash, nor more than 0.5 per cent of ash insoluble in hydrochloric acid.

Fixed oil of nutmeg. The fixed oil of nutmegs is known by many names, some of them confusing: nutmeg butter, balsam of nutmegs, oil of mace, butter of mace, banda soap, and *Oleum Myristicae Expressum*. It is obtained by exposing the nuts to hydraulic pressure and heat and is produced normally from nutmegs that are small, broken, worm-eaten, or otherwise unfit for sale. Nutmeg butter has no culinary importance, but it has found applications in medicine and industry and was an item of commerce as early as the end of the 16th Century (4). At room temperatures it is an orange tallowy mass, with a pronounced aroma of nutmeg and the consistency of butter.

Fixed oil of nutmeg has been used in the manufacture of certain soaps, hair tonics, and perfumes. It may still have very limited medical use in external applications for the relief of rheumatism and sprains (3, 4, 7). In 1908, Power and Salway examined the fixed oil and worked out its composition (12):

1. essential oil	12.5%
2. trimyristin	73.0%
3. oleic acid (as glyceride)	3.0%
4. linolenic acid (as glyceride)	0.5%
5. formic, acetic, and cerotic acids	very small amounts
6. unsaponifiable constituents	8.5%
7. resinous material	2.0%

The unsaponifiable constituents consisted of a new compound $C_{18}H_{32}O_5$ (amounting to about 5 per cent of the expressed oil), together with some myristicin . . . and a very small amount of a phytosterol, $C_{28}H_{48}O$.

Essential oils of nutmeg and mace. The essential or volatile oils of nutmeg and mace are obtained by steam distillation. In commerce, both products go under the name of "oil of nutmeg" (officially, *Myristica Oil* or *Oleum Myristicae*), and, in fact, the com-

mercial oil probably is distilled only from nutmegs since they are cheaper than mace. As in the preparation of nutmeg butter, damaged and inferior nuts are used as sources of the oil (10, Vol. V):

Oil of nutmeg is a mobile, almost colorless or pale yellow liquid, possessing an odor and flavor characteristic of the spice, especially on dilution. With the passage of time, the oil takes up oxygen and partly resinifies becoming more viscous.

Because the oil does not completely reproduce the flavor of whole nutmeg, it is not satisfactory as a substitute for the spice in cooking. ("Essences" of nutmeg and mace sold by spice dealers are alcohol extracts, not essential oils.) But oil of nutmeg has been widely used in industry as a flavoring agent for perfumes and dentifrices and in medicine as a carminative. In fact, it is still official in the United States Pharmacopeia (13).

East Indian *Myristica* oil has the following physical constants: specific gravity, 0.880 to 0.910; optical rotation, $+8^\circ$ to $+30^\circ$; refractive index at 20°C ., 1.4740 to 1.4880. On evaporation, it should not leave more than 2.2 per cent of residue. It is soluble in 3 volumes of 90 per cent alcohol (13).

Oil of nutmeg is chemically complex, as one can see from the analysis by Power and Salway (14):

1. eugenol and isoeugenol	~ 0.2%
2. <i>d</i> -pinene and <i>d</i> -camphene	~ 80.0%
3. dipentene	~ 8.0%
4. <i>d</i> -linalool, <i>d</i> -borneol, <i>i</i> -terpineol and geraniol	~ 6.0%
5. small amount of an alcohol, apparently terpineol-4	—
6. trace of an aldehyde resembling citral	—
7. saffrole	~ 0.6%
8. myristicin	~ 4.0%
9. free myristic acid	~ 0.3%
10. some myristic acid as esters	—
11. small amounts of formic, acetic, butyric, and octoic acids as esters	—

The "odor and flavor, as well as physico-chemical properties of mace oil, closely resemble those of nutmeg oil" (10, Vol. V).

Myristicin, $C_{11}H_{12}O_3$, is interesting as the fraction responsible for many of the physiological effects of nutmeg and mace (15):

It is a yellowish liquid which boils at 149°C. under a pressure of 15 mm. By prolonged heating with alcoholic potash it is converted into isomyristicin, a crystalline solid melting at 49°C. Either of these substances can be converted by cautious oxidation into myristic aldehyde and finally into myristic acid.

Myristicin occurs in the essential oils of several species other than *Myristica*, especially in the umbelliferous genera *Anethum* (dill), *Levisticum* (Scotch lovage), *Pastinaca* (parsnip), and *Petroselinum* (parsley). It has also been found in the mint family (genus *Orthodon*) and the Laurel family (*Cinnamomum glanduliferum*) (16).

Chemically, myristicin resembles three other aromatic ether components of *Myristica* oil: eugenol, isoeugenol, and safrole (Fig. 1).

Until quite recently, both chemists and pharmacologists assumed the "myristicin fraction" of nutmeg oil to be a simple substance (myristicin). In 1963, however, Shulgin (17) showed this assumption to be erroneous. He isomerized the fraction with alcoholic KOH, removed the resulting *trans*-isomyristicin by crystallization, then analyzed the mother liquors by vapor pulse chromatography. Four peaks were observed, three of which turned out to be the expected products of the reaction—methyloisoeugenol, *cis*-isomyristicin, and *trans*-isomyristicin. But the fourth was identified as isoelemicin, suggesting the presence of elemicin in the original myristicin fraction (Fig. 1). Shulgin confirmed the suggestion with low temperature chromatography by separating "myristicin" from nutmeg oil into myristicin and elemicin. He then tried to drive off elemicin from the oil fraction by repeated fractional distillation, but so close is the mixture to being azeotropic that he was unable to raise the myristicin content above 70 per cent. "Consequently," he concluded, "in assigning chemical and biological properties to the substance as isolated from nutmeg, allowance must be made for this congeneric contaminant."

History of Nutmeg As a Medicinal Agent

In Arabian medicine. Shortly after Mohammed's appearance, probably in the middle of the 7th Century, a Syrian priest,

Aron, mentioned nutmeg in a medical compendium that was soon put into Arabic. Clearly, nutmeg even then had found medicinal application, although just how the spice was first prescribed is not known (4). The earliest exact pharmaceutical reference to nutmeg occurs at the end of the 9th Century in a work of a Bagdad physician, Isaac ibn Amran (4). Warburg writes (4) that, even in this early period, *Myristica* was recommended for a variety of disorders but was mainly restricted to those of "the digestive organs, from the mouth to the stomach to the intestines, to the liver and spleen, as well as for freckles and skin blotches."

Later Arab physicians referred nutmeg to the class of "warm and dry drugs" and elaborated on its applications. By the 11th Century, for instance, the spice was praised for its effect on the kidneys, was used to combat pain, vomiting, and lymphatic ailments, and was even mentioned as an aphrodisiac (4). According to Ainslie (18, Vol. I), though, the Arabs were using nutmeg almost solely as a hepatic and tonic by the 19th Century. It seems that physicians of the Near East took little notice of mace until the early 1800's, when they began to prescribe it as an aphrodisiac and carminative (4).

At the present time, nutmeg is still important in this part of the world. A pharmacologist at the Hebrew University of Jerusalem writes (19):

The nutmeg is used by Arabs of Israel and people of its oriental Jewish communities, especially Yemenites, as a drug of their folk medicine, as well as a spice and as an important ingredient in love-potions. It is used against vomiting and to regulate the movements of the bowels; it is good for the liver and for the spleen. It is used in the treatment of TB, against colds, fever and, in general, respiratory ailments. It is said to be an anti-helminthic and is used for that purpose mixed with pumpkin or chickpea seeds. It is used against skin diseases, e.g. eczema, scabies, etc. It is said to be effective for removing blotches from the face. To increase *potentia virilis* it is pounded well and added to various foods.

In Indian medicine. Frequent references in the Vedas to nutmeg indicate that the ancient Hindus knew of the spice from early times. It was described by them as warmth-producing, stimulating, good for digestion,

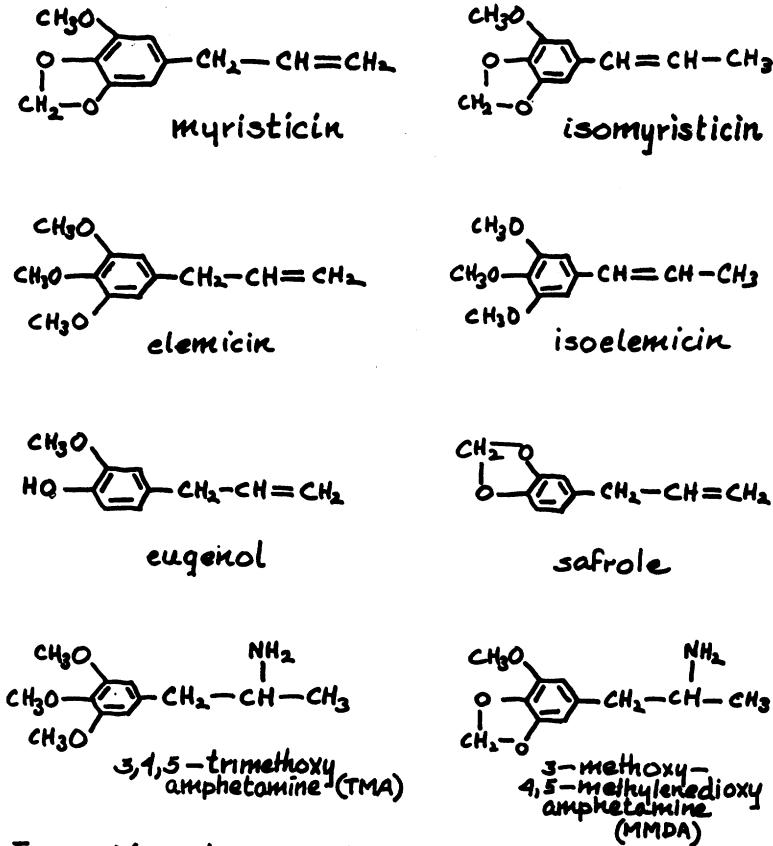


Fig. 1. Myristicin and Some of its Chemical Relations—

and it also figured in their medicinal preparations. Martius (20) says that Hindu physicians prescribed it for headache, nerve fevers, cold fevers, foul breath, and intestinal weakness.

Presumably, these uses continued, for Ainslie (18, Vol. I) in his *Materia Indica* of 1826, writes that nutmeg "is considered by the natives of India as one of their most valuable medicines in dyspeptic complaints, and in all cases requiring cardiacs, and corroborants; they likewise prescribe it to such puny children as appear to suffer from weaning." He adds that Indian physicians administer mace in cases of fever, consumption, chronic intestinal disorders, and asthma. Later commentators confirm Ainslie's observations and add to the list toothache,

dysentery in children, cholera, swellings of internal organs, flatulence, liver and spleen congestion, and rheumatism (4). Dymock, in 1883, is the first to mention an aphrodisiac use of nutmeg outside the Near East. He says (21) that the Moslems of western India use the spice in this way in addition to incorporating it into their remedies. Burkill, writing in 1935 (22, Vol. II), stresses nutmeg's importance in Indian tonics for dysentery and mentions further that the *Medical Book of Malayan Medicine* employs the spice for madness as well as for the usual digestive ailments. According to an adviser in the Indian Ministry of Health, nutmeg is still widely used in Indian medicine (23):

It is prescribed as an analgesic in neuritic pains, as a sedative in highly tense nervous

states, and as a sedative and antispasmodic in asthma. In view of its reaction resembling opium, it is used to give relief in the cough and hemoptysis of tuberculosis. In traditional Indian folk and domestic medicine, nutmeg is used in small quantities to induce hypnotic effect in irritable children. It is also administered as an hypnotic and sedative in epileptic convulsions.

In Western medicine. Medieval European physicians followed exactly the precepts of Arabian medicine. So it is that we find an 11th Century Greek physician, Simeon Seth, calling nutmeg a warm, dry drug and recommending it for the same range of maladies. His only original contribution is his prescription of the spice for pulmonary disorders (4). Warburg writes (4) that:

The importance of nutmeg as a medicine grew hand in hand with the increase in Indian trade during the middle ages; its use spread from the Arabian empire over Greece and Italy and soon reached central Europe. Nutmeg gradually became a genuine folk remedy, although it was most important as a major ingredient in medicines prepared according to guild rules.

Western physicians of the 16th and 17th Centuries merely compiled the writings of earlier authorities on nutmeg. This was the great period of the herbalists, however, and nearly every herbal contained a summary of nutmeg's virtues. The following passage on "*Nux moschata*" from Parkinson's *Theatrum Botanicum* of 1640 (24) is typical:

They [nutmegs] are used in all the cold griefes of the head or braine, for palsies, the shrinking of sinewes, and the diseases of the mother, they are hot and dry in the second degree, and are somewhat astringent, serving to stay the laske, they cause a sweet breath and amend a stincking, they helpe to discusse winde, either in the stomache or bowels, it helpeth to quicken the sight, and to comfort the spirits, and provoke urine, and are comfortable to the stomacke, and helpe those that are feeble or macilent to grow fat as also helpeth Venery and increaseth sperme, they help to procure rest and sleepe by allaying the distemper of the spirits, being applied to the temples. The Macis are of the same property, but somewhat more warming and comforting, the thicke oyle that is drawne both from Macis and Nutmegges, are either of them of good use in pectorall griefes to warme a cold stomacke, and the cough, and to dry up rheumaticke destillations of cold flegme there-

unto or upon the lungs. The chimicall oyle of either is of more efficacy both for pectorall and cephalicall diseases, but must be cautelosly [*sic*] and sparingly used.

An amazing book of the time was *De nuce moschata* or *Moschocaryologia* of J. H. Dietz—a 60-page dissertation on nutmeg, published in 1681. It is important as the first truly systematic treatment of *Myristica*'s applications in medicine, though Dietz lists so many of these that nutmeg is held to be a virtual panacea. In 1704, Dietz's compendium was surpassed by a 900-page monograph on nutmeg—the *Moschocaryographia seu Nucis moschatae curiosae descriptio* of C. F. Paullini. Paullini includes a wealth of historical and cultural material as well as pharmaceutical data. Like Dietz, he considers nutmeg a cure-all, recommending its use in the treatment of no fewer than 138 diseases (4). Later treatises on nutmeg and mace followed Paullini, and not until near the end of the 18th Century did *Myristica* begin to lose the high reputation it gained as a result of all these articles. Warburg (4) has accurately termed the 1700's the "high point of the medicinal use of nutmeg."

Doctors continued for some time to prescribe *Myristica* for intestinal illnesses, but by 1800 they began to realize that many of its effects were the same as those of other aromatics. Then, as modern pharmacy developed, older remedies, nutmeg among them, were relegated to positions of lower and lower priority. In summarizing the medicinal uses of the spice in 1897, Warburg writes (4):

Today the employment of nutmeg and mace in medicine is relatively minor. Nutmeg is now used as a stomachic, stimulant, and carminative, especially in cases of dyspepsia, intestinal catarrh, and colic, and as an appetite stimulant, as well as for its ability to control flatulence. . . .

There is an important omission in the above catalog of nutmeg uses: sometime late in its history—perhaps as late as the 19th Century—nutmeg became known as an emmenagogue and abortifacient. Presumably, folk medicine alone contributed this application, for none of the early scientific papers attribute any abortion-inducing properties to *Myristica*. No one has explained the ori-

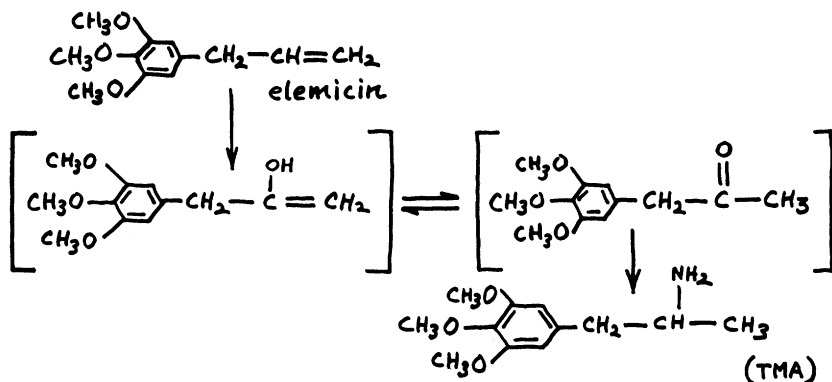


Fig 2a Possible Production of a known Psychotomimetic Agent from Elemicin

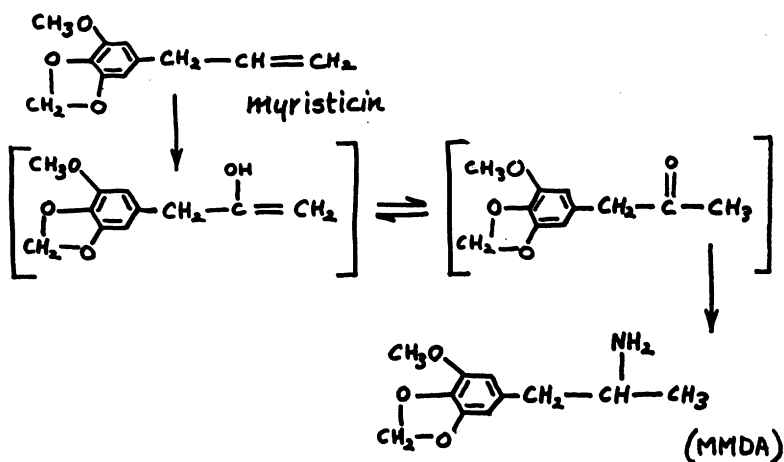


Fig 2b Possible Production of a known Psychotomimetic Agent from Myristicin

gin of the belief, which seems to have been confined to western Europe and North America; and, more puzzling still, many early commentators praise nutmeg's ability to *prevent* miscarriage. (See, for example, Blackwell's *A Curious Herbal*, London: 1739, Vol. II, plate 353, p. 89; Dietz, for one, specifically prescribes it against possible abortion.) All that Warburg can add is that "the emmenagogic, menstruation-promoting effects which have been attributed to it in folk medicine seem very dubious; it appears that nutmeg is still used abundantly to produce abortion by

women in England and America, but mostly with negative results" (4).

This idea has persisted among women into the present century; indeed, Green (25), in 1959, reported the case of a 28-year-old Virginia woman who ate "18.3 Gm. of finely ground nutmeg in an attempt to induce the menses, which had been delayed two days." Some of the older uses of the drug may also be alive in contemporary folk beliefs: McCord (26), for example, cited a 1962 incident in which a 41-year-old South Carolina man, on the advice of a friend, took two

whole nutmegs to relieve a skin infection. McCord also refers to old wives tales about the spice "describing its ability to induce abortion and to cure boils and various other conditions."

Myristica remained official in the United States Pharmacopoeia through U.S.P. XIII, and Myristica Oil is still included in the current edition (U.S.P. XV-1955). The oil is retained primarily as a flavoring agent, but the 25th edition of the *Dispensatory of the United States of America* (1955) designates it also as a "carminative and as a local stimulant to the gastrointestinal tract" (27).

The relevance of nutmeg in medicine to the central topic of the present paper is that the toxic properties of Myristica must have been noticed when patients using the substance accidentally took overdoses of the drug.

Nutmeg Poisoning

Early reports. A number of early European physicians described the symptoms of nutmeg poisoning; however, it is difficult to sort out these references, since a few primary observations of toxicity crop up repeatedly in later articles, often much changed. In modern reference works, the evidence of early commentators is often reduced to the sort of statement that appears in *The Wealth of India* with no amplification (28): "Excessive doses of nutmeg have a narcotic effect; symptoms of delirium and epileptic convulsions appear after 1-6 hours."

The first clear mention of the stupor-inducing action of Myristica occurs in the *Plantarum seu stirpium historia* of Lobelius, published in 1576. As one of his observations, the author writes: "Memini generosam Anglam gravidam esu 10 aut 12 nucum myrasticarum ebriam delirasse."² (4) A second reference is found in *De Medicina Indorum* (1642) of Bontius. He says that nutmegs are seldom eaten because the "oil-rich and fatty fumes" of the seeds rise to the brain where they cause blockages and produce somnolence and stupefaction. "What is worse," he continues, "excessive use of the nut has endangered several persons: they remained motionless and unconscious for

more than a day with clear indications that the whole nervous system had been seriously affected" (29, Vol. IV).

In the same century, Rumphius collected a number of accounts of serious consequences attending the ingestion of large amounts of nutmeg. He related the following incidents (4):

1. In 1665, some Germans ate a cold soup of the usual beer and wine in which, according to their statement, they had put nothing other than sugar and seven or eight grated nutmegs. The next day, they suffered acute respiratory distress, feeling as if they were about to suffocate. Their mouths became very dry, their lips swelled, and their heads felt "heavy and giddy." In addition, they became seriously constipated.
2. Two soldiers in Manipa (in the Banda Islands) slept the whole night under a nutmeg tree and woke up with such hangovers that they seemed to be drunk.
3. In 1650, two other soldiers in the Banda Islands became confused and half insane after eating five nutmegs.
4. In 1657, a woman was found dead in her bed with a basket full of nutmegs in front of her. It was concluded that she had eaten so many of the seeds that she sank into a fatal stupor.

These anecdotes of Rumphius are second-hand and open to criticism. The second is especially dubious. Probably, the soldiers used the nutmeg tree to cover up the effects of a drunken spree. Yet, there is so much of this anecdotal material that, considered in its entirety, it makes a convincing case. Another example is this interesting recipe from a 14th Century pharmacopoeia in Middle High German: "Wultu enen vordrynken, nym ene verssche gude muscaten, snyd de mydden untwe unde gif eme de helfte ethen; darna gif eme de anderen helfte ethen, unde gif eme echter hastichliken drinken, so wert he drunken."³ (30)

In 1789, the English physician, William Cullen, described (31, Vol. II) a case of Myristica poisoning from his own experience:

³ If you wish to get someone drunk, take a good fresh nutmeg, cut it in half through the middle, and give him one of the halves to eat; then give him the other half to eat and make him take a quick drink. In this way he will become drunk.

²I remembered a pregnant English lady who, having eaten 10 or 12 nutmegs, became deliriously inebriated.

I have myself had an accidental occasion of observing its [nutmeg's] soporific and stupefying power. A person by mistake took two drams or a little more of powdered nutmeg; he felt it warm in his stomach, without any uneasiness; but in about an hour after he had taken it, he was seized with a drowsiness, which gradually increased to a complete stupor and insensibility; and not long after he was found fallen from his chair, lying on the floor of his chamber in the state mentioned. Being laid abed he fell asleep; but waking a little from time to time, he was quite delirious: and he thus continued alternately sleeping and delirious for several hours. By degrees, however, both these symptoms gradually diminished, so that in about six hours from the time of taking the nutmeg he was pretty well recovered from both. Although he still complained of headache and some drowsiness, he slept naturally and quietly through the following night, and next day was quite in his ordinary health.

There is no doubt that this was entirely the effect of the nutmeg. . . .

Ainslie (18, Vol. I) writes that "nutmeg, like mace, taken in large quantity, is apt to produce stupor and drowsiness" and points out that Hindu physicians are therefore cautious in using both spices.

The great physiologist, J. E. Purkinje, conducted self-experiments with nutmeg in 1829 (32). For his first test, Purkinje ate one whole nut with sugar. He felt a weariness and depression for the whole day without mental disturbances and decided to try a larger dose the next time; subsequently, he ate three nutmegs on one afternoon. Shortly thereafter, he experienced marked drowsiness interrupted by pleasant dreams and some restlessness. His own description of later effects (33) is significant, because it is quite unlike the accounts one finds in most articles and strikingly similar to descriptions of *Cannabis* intoxication:

At half-past six, when it was almost dark, I woke up in order to go to the Royal Theater at Bruecker Street where I lived. The distance was long, but this time I thought it had *no end*. My movements appeared entirely adequate, but were lost momentarily in dream pictures, from which I had to extricate myself with considerable force in order to keep on walking. My feet did their duty and, since I had to stick to a straight road, there was no danger of going astray. I went forward in this dream, for, if I attempted to orient myself, I could not even recognize the cross streets. Time

seemed long, but I got to the opposite side of the place where I was going. During this time dreams and physical activity battled one another. The return journey was good, and I slept well that night and next day.

In 1841, Endlicher listed the symptoms of *Myristica* poisoning as pressure in the chest, heavy breathing, intense thirst, headache, inebriation, and even delirium and "fatal apoplexy" (34). Pereira (1850) cited a new case in which two drams of powdered nutmeg caused somnolence deepening to complete stupor (35). Warburg mentions (4) another case, reported in the *British Medical Journal*, of ingestion of one nutmeg as a cure for diarrhea—even this amount was enough to cause giddiness and drowsiness lasting until the next day. He also says that Ten Bosch, in 1865, described severe poisoning from eating seven seeds, and he mentions an incident in Florida where consumption of one and one-half nutmegs produced, within an hour, insomnia, which, in another hour, passed first into stupor, afterwards into excitement, headache, laughing fits, and fantasies, followed by collapse. On the other hand, Warburg reports (4) that Frommüller, in the course of experiments on sedatives, gave people two large nutmegs and observed buzzing in the head as the only symptom.

Poisoning by mace is never mentioned in the literature, with one notable exception. G. C. Watson, in 1848, published a dramatic account of mace intoxication (36), one that most later commentators, including Warburg, have missed and that, like Purkinje's observations, does not conform to the usual pattern of general physical excitement followed by stupor. Watson quotes the patient's own description:

At about eleven o'clock in the forenoon of the 12th of March, 1847, I was in a sale-room in which there were samples of spices &c.; and from curiosity, I ate about as much mace as could be lifted on a teaspoon, if broken small. About half-past twelve o'clock I felt a pain on the crown on the head, extending over a space about the size of a penny piece; I also felt a slight nausea of the stomach, as if I had been smoking inordinately. I had kept eating the mace in small bits over about an hour and a half. I walked home and dined about three o'clock. I still felt the pain slightly on the top of my head, and also the nausea and slight gid-

diness. I rose from dinner and looked out at the window, to dissipate, if possible, this disagreeable feeling. I then felt the blood rush to my head, but the feeling was as if an electric current had passed from the crown of my head downwards. Not wishing to be overcome in the room in which I then was, I made an effort, and got mechanically down-stairs. I then felt the same sensation which I suppose a person would experience who had become nearly insensible from extreme cold, and that if I had yielded myself to its influence, I could have slept away existence without pain. I felt this sensation twice; the second time when I had got down stairs into the back parlour. I then walked about in the back yard, to endeavour to drive away the extraordinary sensations, but in a few minutes a cold shiver came upon me. I then got into the house, and laid myself upon a sofa near the fire.

From that time I felt every variety of heat and cold from their respective extremes. At every time the blood went and returned from my head, the current changed the sensation, sometimes feeling myself very hot, and the next very cold, but never the same sensation. I felt at one time such a pressure in the head, that it appeared as if all the blood in the body had rushed to obtain possession of that region, and I thought I could hear it gushing in my ears. These symptoms became gradually weaker.

A medical gentleman was hurriedly called in and some brandy was administered. The effect of this upon me was as if I had been electrified from the roof of the mouth downwards in a straight line, and dying off towards the feet; it then seemed to diffuse itself over the whole body. The state of my body generally felt as if I had hold of slightly galvanized wires, the wires apparently working in antagonist directions, out of tune and keeping;—like in fact, so many connecting rods working from excentrics out of truth, and jarring against each other. The state of the mind was, I should suppose, similar to that of the opium eater, entertaining no apprehension of the result, although aware of the presence of some danger.

Watson remarks on the persistence of this mental disturbance: three days later, the bizarre state of consciousness had still not abated entirely, and the man's thoughts "hardly submitted themselves to his control, unless by a consciously great effort."

Wide use of *Myristica* as a remedy in the Far East would lead one to expect numerous cases of poisoning in that part of the world, but, oddly, no reports on any such mishaps seem to occur in the literature, and it is not

possible to trace to its source the inadequate statement in the 19th edition of the *Dispensatory of the United States of America* (37):

Nutmeg unites to the medicinal properties of the ordinary aromatics considerable narcotic power. In the quantity of two or three drachms (7.7 or 11.6 Gm), it has been known to produce stupor and delirium, and dangerous if not fatal consequences are said to have followed its free use in India.

Intoxication following the use of nutmeg as an emmenagogue or abortifacient. By far the greatest numbers of people poisoned by nutmeg have been women—mostly English and American women in the late 19th and early 20th Centuries—who took the spice in efforts to bring on menstruation or induce abortion. A great many of these cases appear in the literature of the period, particularly in British medical journals. Commenting on them in 1962 McCord observes (26):

It is interesting that of all the instances reviewed in which nutmeg was taken as an abortifacient, this effort was successful in only one patient. Even in this instance the role of nutmeg was open to question since the abortion followed the ingestion by a period of a month.

Examples of this sort of poisoning are too numerous and too repetitive to warrant a complete inventory. Selected cases give a good clinical picture:

In 1881, Hammond (38) published an account referring to a woman who took one and one-half powdered nutmegs in half a glass of hot water. Two hours later, she had violent stomach pains followed by headache: then consciousness was lost for six hours. Eventually, she vomited and, after twelve hours, recovered. In a similar instance (4) a woman took three nutmegs and developed stomach pains and nausea in two hours. After another hour, she lost consciousness and remained unconscious for eight hours with weak pulse, slow breathing, elevated temperature, protruding eyes, dilated pupils, cold extremities, cyanotic lips and nails, and flaccid sphincter muscles of the bladder and intestine.

The American physician, P. J. Farnsworth, in 1904, reported some of his observations on nutmeg (which, he says, in large quantity "is like an overdose of Chloral without any of the depressing symptoms") (39):

Some years ago I was called in the evening to see a young married lady who was visiting some wealthy friends in the country. About noon she had been discovered in a profound sleep, from which they were unable to arouse her. Her respirations were natural, her pulse soft and a little slow, pupils a little dilated but responsive to light, skin moist, extremities rather cool. I could get no history of accident or previous illness, and directing them to watch her and report any change, I concluded to wait further developments. The sleep continued well into the next day, when she was aroused with no other feeling than languor from so protracted sleep.

She said she had gone a few days over her "period" and was told that nutmeg was a good remedy to bring it on. That she also had a "looseness" of the bowels. She grated into a spoonful of brandy three (3) medium sized nutmegs, that it had a pleasant taste and she ate the whole, and soon after fell asleep. Her menstruation returned and the diarrhoea was checked and she felt no other inconvenience.

During a discussion of a paper on nutmeg at the Royal Society of Medicine in 1909, some additional facts emerged (40):

J. Gray Duncanson said that people in this country [England] did not take nutmeg to cause death but to produce abortion. . . . Nutmeg was somewhat frequently taken by women especially in the neighbourhood of London, to bring on a miscarriage, but as it was done surreptitiously it was very difficult for the medical man to ascertain in what form and in what quantity it was taken. Those cases which he had seen had been marked by gastro-intestinal disturbance, and it was difficult to know whether to attribute that to the nutmeg entirely, or in part to the gin with which it was most frequently administered. In one case which he saw some years ago there were certainly cerebral symptoms—hallucinations and delusions.

Beck, in 1914, reported (41) the cases of two women who took two ground nutmegs mixed with wine, hoping to bring about miscarriage. They experienced dyspnea, some loss of memory, and drowsiness. Both were found unconscious with weak, rapid pulses; both recovered in three to five days.

There are many other reports (42). Summarizing all these data, McCord writes (26):

. . . patients have consumed from 1 to 3 nutmegs and have experienced restlessness, dizziness, fear of death, coldness of extremities, oc-

casional nausea and vomiting, abdominal pain, and precordial pain or oppression. These patients were found to be extremely agitated, delirious, and dyspneic and have had weak, rapid pulses and decreased body temperature. On several occasions patients were found unconscious. Occasionally there was flushing of the face while at other times pallor with cyanosis of the lips and nails predominated.

He attributes these intoxications to "a central nervous system depressive effect with periods of stimulation and associated respiratory and cardiovascular difficulties. Occasional case reports have suggested a possible hypersensitivity reaction as illustrated by the presence of facial and periorbital edema with flushing."

Other cases and recent cases. Occasionally, *Myristica* intoxication occurs in children who have accidentally eaten a quantity of nutmeg; if a stupor results, it may be serious. In fact, the only fatality ever attributed to the spice occurred when an eight-year-old boy ate two whole nutmegs, became comatose, and died less than 24 hours later (43). Farnsworth mentions (39) another eight-year-old poisoned by one nut: "Sleep continued through the day with some jerky breathing and some convulsive twitching. . . . The child came out of it all right."

G. Mendelsohn relates (44) the incident of a man who took "2 to 3 pieces of ground nutmeg" in order to clear up "eczema associated with varicose veins." Consequences included dyspnea, dryness of the mouth, loss of memory, and deep sleep with recovery the following day.

The apparent "epidemic" of nutmeg poisoning around the turn of the century subsided after the First World War. Cases since then have been rare. Green's 1959 report (25) on a 28-year-old woman, who attempted to bring on menstruation with 18.3 g of ground nutmeg, includes the usual physical symptoms as well as profound mental changes which came on eight hours later:

She had then become completely disoriented, with episodes of wild screaming and purposeless thrashing of the arms and legs. Coordination appeared absent. Interspersed with the disorientation were brief moments of lucidity during which she seemed to be aware of her surroundings. From the time of her awakening at 5:30 a.m. until 9:30 a.m., when she was

seen by her local physician, there were three intervals of lucidity, each lasting about 10 minutes. The rest of this time she was delirious and in a state of excitement and agitation. . . .

The patient remained in a semistupor for 12 hours after her admission. She then began to experience episodes of wild excitement, with loud screaming and manifestations of a fear of impending death. She continued to be subjected to episodes of excitement for two hours, during which time restraints were needed. For the remainder of the second day she was restless but essentially quiet. During the third and fourth days of hospitalization she slept much but complained constantly, while awake, of a generalized feeling of numbness and dizziness.

Effects of the toxin continued with decreasing severity through the sixth day.

McCord's case in 1962 (26)—the 41-year-old man who ate two nutmegs to alleviate a skin infection—included such symptoms as increased perspiration, dryness of the mouth, drowsiness, weakness, frequent attacks of rapid breathing and "vague, fleeting pains in the chest and left arm," and a pronounced feeling of impending death. According to Payne (45) two college students (19 and 20 years old) had similar experiences in 1963 after each had ingested two tablespoons (about 14 g or the equivalent of two whole seeds) of powdered nutmeg suspended in milk. About five hours later ". . . each had the onset of a significant pharmacologic effect, heralded by a leaden feeling in the extremities and a nonchalant, detached mental state described as 'unreal' or 'dreamlike.' Rapid heart rates and palpitation were noted, and both complained of dry mouth and thirst. Onlookers observed that one student became quite hyperactive and agitated, and talked incoherently. It was noted that the faces of both were 'as red as beets.' Nausea, vomiting, and abdominal cramps were absent. . . . One described a sense of impending doom, as if he were 'breaking up inside.'"

Extreme drowsiness occurred about seven hours after these symptoms began and continued for the next 24 hours. Recovery was complete, but "both patients stated emphatically that a sense of unreality persisted for 48 to 60 hours from the time of 1 oral dose of nutmeg."

Ample evidence, then, is available on the toxic effects of nutmeg and mace. A puzzling

feature of this evidence is its inconsistency; there seems to be no agreement on what symptoms characterize the intoxication or on what doses produce it.

Pharmacology of Nutmeg

Before 1910. As a historical curiosity, it might be mentioned that the first pharmacological experiments on nutmeg were performed by van Leeuwenhoek, the Dutch microscopist, around 1676. He exposed mites in a glass tube to pieces of nutmeg and observed that they would first approach the nutmeg and then rebound as they moved closer. If they stayed too close too long they died (32). Despite this noble beginning, and despite all the indications that *Myristica* was an important cause of poisonings, the pharmacology of nutmeg was neglected for many years.

As late as 1900, little was known about the action of *Myristica*, largely because researchers could not agree on which component of the seed contained the active principle: essential oil, fixed oil, or endosperm. Although many investigators correctly attributed the narcotic properties to a fraction of the essential oil, a number of writers, Warburg among them, refused to accept this conclusion (4). Warburg, himself, believed a "resin" to be accessory to the oil and expressed regret that experiments (up to 1897) had examined only effects of the oil, which he writes (4), "like all essential oils, is toxic in itself, but which apparently is not present in sufficient quantity to account for the poisonous effects of such small doses of nutmeg (e.g., 6 to 8 g or one and one-half seeds)."

But Frosch had demonstrated, before 1850, that 0.03 g of oil of mace exerted a paralytic effect (4), and, in 1848, Mitscherlich (46) found that 8 g of oil of nutmeg killed a rabbit in 5 days, while 24 g were lethal in 13 hours. Four grams of nutmeg oil killed small rabbits in 30 hours, and even one gram made them sick for several days. Mitscherlich judged these effects to be as strong as those of oil of cinnamon but weaker than those of oil of bitter almonds. Post-mortem examinations revealed "changes in the stomach and small intestine similar to those produced by cinnamon oil and other

essential oils: there were blood blisters in the mucous membrane of the stomach; the epithelium of the small intestine had been torn off and turned to mucus; but the colon showed no peculiarities."

Had such reports become well known, they might have hastened the development of knowledge on nutmeg poisoning. As it was, further data were not forthcoming until 1903, when G. B. Wallace published the results of his studies. By that time, the chemistry of *Myristica* had been investigated, and the findings, which Cushny has summarized, were helpful (43):

The nutmeg contains from 3 to 8 per cent of volatile oil, and when this has been extracted from it the residue produces no effect whatever on animals, while small doses of the oil itself induce characteristic effects. The oil contains several terpenes and small quantities of higher boiling substances which can be separated by fractional distillation. The terpenes are devoid of action, except in enormous quantities, while the fraction boiling at 150°C at 14 mm. pressure proved to be a powerful poison.

The poisonous fraction was named "myristicin," and Wallace (47) was the first person to test this pure principle in animal experiments. He found that frogs, placed in a dilute aqueous solution of myristicin, showed initial restlessness, followed by depression and complete paralysis. Death ensued if the animals were not removed from the solution. Similar effects followed injection of the solution into the lymph sacs. Wallace showed the action to be confined to the nervous system, with no effect on muscles; the heart, for example, kept beating normally, even when bathed with the solution. Wallace observed similar reactions in rabbits, with ultimate death from respiratory failure. He further noted that the cat was much more susceptible than other animals to the toxic action of myristicin.

In 1904, F. Jurss reported (48) experiments in which he had given myristicin to frogs, fish, birds, and mammals, particularly guinea pigs and rabbits. Jurss calls attention to a puzzling fact when he writes: "The oils of nutmeg and mace only cause fatal poisoning in a rabbit in doses of 10.0 to 12.0 grammes, whereas a single nutmeg (4.0 to 5.0 grammes) is capable of producing in man serious effects." Jurss concluded from

this that the oil was more poisonous for man than for animals. Power and Salway, however, point out (49) that the "essential oil of nutmeg is very variable in character, and that some specimens may be practically free from myristicin . . ." Jurss used subcutaneous injections of myristicin (2 cc to 6 cc per kilo of body weight for guinea pigs and 0.9 cc to 1.76 cc per kilo of body weight for rabbits) and found paralysis of the central nervous system followed by death without convulsions. Extensive degenerative changes of the liver were seen in post-mortem examinations.

Sir Henry Dale's investigations of 1909 (40) confirmed Jurss's finding of advanced fatty degeneration of the liver in all cases of death from myristicin. Dale also attacked the question of how the symptoms in animals differed from those in man. Cushny had written (43): "Animals . . . correspond very closely to man in their reactions to nutmeg poison," but Dale showed that this was not so. In man, ingestion of one or more nutmegs causes narcosis varied by excitement and delirium, with recovery after 24 hours. In Dale's words: "The general impression given by most of the clinical records is of a temporary intoxication, which usually passes off without leaving any obvious bad result. . . . On the other hand, I found that the smallest dose of nutmeg, which would produce in a cat any recognizable effect, invariably produced death. . . ." Thus Dale observed that doses smaller than 5 g did not affect the cat, but he cites a case in which a cat weighing 2640 g was given exactly 5 g of grated nutmeg by mouth, which killed it in 48 hours. In the cat, one sees "a uniformly fatal coma appearing after a few days, always associated with, and probably secondary to degenerative liver changes. . . ." (40). The temporary effects in man appear with relatively much smaller doses.

Dale analyzed his observations correctly (40):

The primary effects on the nervous system, when produced in the cat, are, indeed, closely similar to those observed in man. But, whereas man is so sensitive to the primary action of myristicin that he can be temporarily narcotized by doses of nutmeg too small to leave any permanent bad effects, the nervous system of the cat is relatively so little responsive that doses considerably in excess of that which will

certainly kill the cat are necessary if the primary effects, as seen in man, are to be reproduced. The death of the cat is in any case, due to secondary coma. . . . The secondary coma I regard as an entirely different phenomenon from the primary action on the nervous system. . . .

A perplexing characteristic of nutmeg poisoning is that pure myristicin, in order to cause the primary symptoms, has to be taken in amounts exceeding those found in normally toxic doses of whole nutmeg. This led some researchers to conclude that myristicin was not entirely responsible for the narcotic effect of *Myristica*. Dale showed that the results one got with chemically pure myristicin in experimental animals were qualitatively identical to those obtained with nutmeg, but that "the dose given must be proportionately larger." His conclusion, however, is that "the difference in doses may with great probability be attributed to the readier absorption of myristicin when it is associated with the fats and other constituents of the whole drug."

Power and Salway took up the investigation after Dale's study. In a paper of 1908 (49), "Chemical Examination and Physiological Action of Nutmeg," these two authors explore the possibility that the narcotic properties of nutmeg may be due to something other than myristicin. They first carried out special assays for alkaloids or soluble proteins and got negative results. Next, they ran exhaustive tests of the essential oil, the fixed oil, and the press-cake remaining after removal of the fat.

Power and Salway observed what Dale had: that quantities of myristicin in excess of those found in toxic amounts of nutmeg (i.e., toxic to cats) had no apparent effect when given to the cat. On the other hand, none of the other components of nutmeg tested showed any physiological activity. The authors conclude:

It would be quite reasonable to attribute all the effects of nutmeg on the cat to myristicin, but for the fact that the dose of nutmeg sufficient to cause death in a few days represents a quantity of myristicin which, given by the mouth, produces no appreciable effect. It seems possible however, that the discrepancy may be explained by a consideration of the conditions of absorption. Thus the failure to obtain an effect with small doses of myristicin

may be due to its being only imperfectly absorbed when given in a pure state, and passing out to a large extent in the feces.

If this were so, a small dose of myristicin would be more effective if injected subcutaneously in order to ensure slow, continuous absorption. And, in fact, a dose of about 0.12 cc injected subcutaneously in the cat causes "a very slow but ultimately extensive degeneration of the liver . . .," while up to 0.2 cc has no effects when given orally (49).

The final statement of Power and Salway seemed to settle the problem (49):

. . . there would appear to be no doubt that the narcotic property of nutmeg is correctly attributed to myristicin . . . and it may be assumed that the latter substance when associated with the other constituents of the nutmeg is in a condition much more favorable for absorption than when in a pure state. As in the case of many other narcotics, the lower animals are much less sensitive than man to the direct action of nutmeg on the cerebral functions.

Recent studies. Pharmacologists did not re-open investigations into *Myristica* until more than 50 years after Power and Salway published their findings. In 1961, Truitt et. al. conducted a study to determine the safety of nutmeg in man. "In humans," the authors write (50), "the ingestion of one or two ounces of ground nutmeg appears to produce a prolonged period of delirium, disorientation, and a syndrome comparable to alcoholic inebriety."

Truitt and his co-workers first tested the effects of 400 mg of pure myristicin on ten subjects, four of whom had definite reactions to the compound (50):

These reactions ranged from a feeling of euphoria and restlessness to weakness, nervousness, tremor, and anxiety, tachycardia, gastrointestinal discomfort and nausea. One of the experimenters ingested 15 gms. of nutmeg in acacia suspension. Reaction started in one to two hours, and effects did not disappear until approximately 36 hours after ingestion. Symptoms were marked by vasomotor instability, tachycardia, hypothermia, absolute absence of saliva, constricted pupils, some emotional lability, and a tremendous feeling of isolation and inability to carry on intellectual processes.

Because the reactions to myristicin did not include all of the symptoms produced by whole nutmeg, the investigators thought that

other substances in the seed might be pharmacologically active. Accordingly, they tested the effects of 10 mg doses of nutmeg from which all volatile constituents had been removed and found that these produced none of the psychopharmacologic effects of the whole drug but did yield, in some instances, "the undesirable side effects of occasional flushing, lower intestinal discomfort, and unusually heavy sleep or insomnia." "This suggests to the authors," they conclude (51) "that other volatile constituents (safrol, borneol, linalool, eugenol, isoeugenol, and geraniol) in nutmeg contribute markedly to its psychopharmacologic effect in man," and (50) "that myristicin does not reproduce the entire activities of whole nutmeg"—conclusions opposed to those of Power and Salway.

In reviewing the findings of Truitt's group, Shulgin, in 1963 (52), speculates on their theory. He says that the myristicin fraction of nutmeg oil "is strongly suspect of representing the effective toxic factor for cats. . . ." but that it appears "ineffective in duplicating the psychological effects of total nutmeg in man." He then goes on to consider possible pharmacological activity of other components of the oil:

The minor aromatic ethers, eugenol and safrol, have been suggested as possible active components. This seems unlikely, as the amounts ingested from a 5 g nutmeg (0.001 g and 0.003 g resp.) are much below the usual therapeutic levels of these substances (3.0 ml and 0.5 ml. resp.). The only component, aside from the myristicin fraction, of the volatile oils from nutmeg that deserves serious consideration as an active agent, is the pinene-dipentene fraction. Many descriptions of the toxic syndromes of representative terpene medicines parallel the common toxic manifestations of nutmeg (i.e., nausea, cyanosis stupor, cold extremities, often delirium). [However] Actual toxic dosages of oils that are of make-up similar to the hydrocarbon fraction of nutmeg (as oil of turpentine) are as a rule 20 to 60 times higher than that which would be encountered in nutmeg intoxication.

It is Shulgin's conclusion (52), not Power and Salway's, which now seems incontestable: "As yet, no known pharmacology of any known component of oil of nutmeg can explain the syndrome of the whole nutmeg."

Evidence of Narcotic Uses of *Myristica Fragrans*

Persistence of rumors. Only one genus in the family *Myristicaceae* is definitely known to be used as a narcotic. It is not *Myristica*, but *Virola*—several species of South American trees, the barks of which furnish a resin that is made into the violently toxic snuff called "yakee" or "paricá" by Indians of the northwest Amazon. Medicine men use yakee for prophesying or diagnosing disease, usually inhaling up to one heaping teaspoonful of the brownish gray powder. According to Schultes (53) whose paper of 1954 (54) is virtually the only reference on this exotic drug, the users then "fall into a delirious stupor or sleep during which the shouts they emit are interpreted by assistants. That the intoxication can be dangerous is admitted by the medicine men themselves, and the death of one medicine man of the Puinave tribe . . . is laid to the use of yakee snuff." Schultes notes (53) that the active principle of yakee "has not yet been determined, but there is every reason to believe it to be the same essential oil [*sic*]—myristicine—which occurs commonly throughout the family and which is the narcotic principle in household nutmeg."

In 1964, however, Holmstedt analyzed samples of *Virola* snuff for tryptamines and found 5-methoxy-N,N-dimethyltryptamine to be a major component of this narcotic. He also discovered small amounts of N,N-dimethyltryptamine (DMT) and 5-hydroxy-N,N-dimethyltryptamine (bufotenine) (66). The pharmacology of 5-methoxy-N,N-dimethyltryptamine is poorly understood, but both DMT and bufotenine are known psychotomimetic drugs.

Even these meager data on *Virola* are more conclusive than almost anything yet available on the narcotic use of *Myristica*. The search for answers to the question: Is nutmeg used as a narcotic? leads to innumerable blind alleys. To begin with, the medical literature is of no help because nearly all the reported cases of nutmeg intoxication have resulted from accidental ingestions or from overdoses taken as remedies. Documented accounts of the deliberate use of *Myristica* for narcotic effects are discouragingly hard to find, and it is not surprising that the Federal Bureau of Narcotics

writes (55): "The common nutmeg, *Myristica fragrans* is not considered to contain narcotic substances; and it therefore is not under the jurisdiction of this Bureau. We are not aware of any constituents of nutmeg which would bring it under the control of the Federal Narcotic Law, nor do we have any data concerning its use."

At the same time, there is an impressive amount of anecdotal material suggesting that nutmeg is consumed as a psychoactive agent by many people throughout the world. One hears persistent rumors, for instance, that Myristica serves as a narcotic in the Orient, that it is commonly taken by prison inmates, and that it has caught on as a new hallucinogen among bohemians. The remainder of this section is an appraisal of such rumors.

Is nutmeg used as a narcotic in the East? In 1883, Dymock (21) wrote that the Hindus of western India take Myristica as an "intoxicant"—not just as a broad-spectrum remedy and aphrodisiac. His brief reference is one bit of published evidence which supports the curious popular belief among American narcotics-users that nutmeg is in widespread use in India. Another scrap of confirmation is a second line from Dymock, in a paper of 1889, "The Spices and Drugs of the East" (2): "Nutmegs are narcotic and are often eaten with *pan supari*." But nowhere else in Indian medical literature is Myristica spoken of in connection with *pan* (betel chew) except as a flavoring adjunct. In addition, most native students of Indian customs are unaware of the narcotic effects of the spice. Finally, with the abundance of hemp preparations available in India, one would not expect the people of that country to have to resort to Myristica.

Yet, there is reason to believe that Indian folk practices embrace the use of nutmeg as a narcotic, though certainly not on as wide a scale as drug-takers in this country seem to think. An obscure clue is one of the synonyms for nutmeg used in Ayurveda: *Mada shaunda*, meaning "narcotic fruit." Dr. C. Dwarakanath of the Indian Ministry of Health informs me (23) that "*M. fragrans* is generally chewed together with betel for the slight excitement it gives. It is also consumed orally with a view to stimulating the libido. *Mada shaunda* refers to its narcotic action." He adds that "in certain parts

of southern India, *M. fragrans* is mixed with tobacco snuff and used." K. R. Ramathan of the Council of Scientific and Industrial Research, New Delhi, has tried to get more information on this last implication. He writes (23): "We have made some inquiries regarding its use in the manufacture of snuff, where it is reported to be employed as one of the ingredients. While the large-scale manufacturers have denied the use of nutmeg in snuff manufacture, it is possible that nutmeg may be used on a very restricted scale by those who are aware of its properties." Evidently, there is some factual basis to the rumored consumption of nutmeg as a narcotic in India.

Another story frequently encountered is that *Cannabis* devotees will turn to nutmeg when they cannot get hemp. Again, there is only one bit of supporting evidence—a line from Bamford's *Poisons* (15) of 1951: "Within the last few years, partly owing to the difficulty in obtaining hashish, it has become the practice in Egypt to substitute powdered nutmeg. In sufficiently large doses this produces symptoms similar to those of hashish intoxication and the effects may even be much more severe." Unfortunately, governmental agencies in Egypt have not answered questions about this practice, and no other writer confirms Bamford's observation. An Israeli pharmacologist comments (19): "I have not come across any use of *Myristica fragrans* as a narcotic among the Arabs in Israel, but that does not mean to say that there is not some use of it for that purpose." Regrettably, the matter must be left there.

A final implication of Myristica as a narcotic in the East is its rumored use as a snuff in Indonesia and Malaya. Klaus Stopp, who spent much time in the area, says (56) that "no use of nutmeg as a narcotic had come across to me in New Guinea; if there is such a use in the Eastern part, it must be very local." On the other hand, Nathan S. Kline, on returning from Indonesia in 1964 wrote (57): "It is my understanding that nutmeg is often used as a snuff during attendance at the Wayang plays which often go on from early in the evening until the next morning." The Wayang plays are kinds of puppet shows, popular throughout much of southeast Asia; no confirmation of Kline's

belief is yet available. In fact, two independent investigators in Indonesia assure me that nutmeg is *not* used as a narcotic in that country, except possibly in very rural eastern areas (58).

Is nutmeg used as a narcotic in prisons?

Most stories in circulation about nutmeg as a narcotic concern its use in prisons. If they are true, it would seem that nutmeg and mace could often be serious problems in correctional institutions. An officer of the Federal Bureau of Prisons dismisses this idea as an exaggeration (59):

We are aware of the narcotic reaction these spices may have when improperly used, and therefore, it is standard practice in the Federal prisons to maintain careful control of both items. Due to this control and also to the fact . . . that few people are aware of their stupor-inducing powers, we have no problems with these items. I have read articles in various publications which imply that the use of nutmeg and mace is widespread in prisons. However I do not know of a single instance in the Federal Prison system where either spice was used by inmates for its narcotic effect.

But his statement does not settle the issue. A short article on page 22 of the Chicago *Sun-Times* of March 3, 1961, headlined "Nutmeg Costs a County Jail Guard His Job," proves at least that people in some prisons know what *Myristica* can do. The article begins: "A County Jail guard was fired Thursday (March 2, 1961) after he was caught trying to help inmates get a cheap thrill. Warden Jack R. Johnson said Robert H. Brooks, 49, was apprehended Wednesday taking nutmeg and nose inhalers into the jail. Brooks . . . had four ounces of nutmeg and 16 inhalers suspended inside his trousers, Johnson said." The writer did not bother to explain what sort of "cheap thrill" one can get from nutmeg and nose inhalers.

More evidence comes from the Director of the Addiction Research Center at the United States Public Health Service Hospital in Lexington, Kentucky—W. R. Martin. Martin (60) says that many patients he has seen believe mace and nutmeg, especially nutmeg, to have "stimulating effects," usually because they have heard the prevalent rumors. He adds that patients rarely volunteer information on *Myristica* experiences and that the practice of using nutmeg or mace is far

from universal; but he estimates that about one out of ten Lexington patients will admit having tried occasional self-experiments with these spices. Most persons who have used *Myristica*, he feels, do not attach much importance to it until they are confined within institutions. Martin also writes:

I spoke this morning with . . . the chief of security at this hospital. . . . To his knowledge there has never been any incidence of acute intoxication with either of these agents in the hospital. He believes that the use of these agents may be more common in prisons in which the main population is made up of addicts, than in general prisons. Although there have been no cases of reported intoxication, he said the effects of these agents on the prison community are very similar to those of heroin and barbiturates. Gangs are organized to sell them, and fights and disorders may result when a customer fails to pay off his obligation.

There is substantial confirmation of Martin's impressions in an article by Weiss (61) describing a study on the "Hallucinogenic and Narcotic-like Effects of Powdered *Myristica*" conducted at the New Jersey State Prison, Trenton, in 1960. Weiss notes that many commercial and medicinal substances are used covertly by prisoners to "escape from one's self and the depressing, immediate surroundings," and he says without qualification: "Powdered *myristica* . . . is included among the inmates' repertory of alleged euphoria-inducing drugs."

It is widely believed by inmates of correctional institutions that the drug action of nutmeg produces reactions similar to those of legally prohibited drugs which are considered habit forming and addicting. Although its illicit application is most certainly not widely known in the extra-mural setting, personal communications by prisoners are to the effect that it is used, not only in the community [i.e., the outside], but was also used in the armed forces in Europe in World War II.

Weiss studied ten male inmates of the prison, most of whom had had previous experience with marihuana and other drugs. Six of them had learned of the use of nutmeg during their imprisonment; the others had already known about it. He obtained introspective reports "chiefly from eight subjects, since two developed toxic psychoses as a result of chronic ingestion of ground nutmeg." The first astonishing fact Weiss

uncovered was the frequency with which some prisoners use *Myristica*. Of his ten subjects, one had tried nutmeg 10 different times, one 30, one 52, and one 475.

Equally interesting are the dosages and reactions. The minimum amount of ground nutmeg any man ingested was two to three tablespoonfuls, and one had once taken *two cups* of the spice as a single dose (apparently without unusual reactions or permanent systemic damage). The drug was always taken orally, usually stirred into hot liquids (61):

The effects of these large dosages differ substantially from those cited by Power and Salway. While some of the inmates experienced drowsiness, none experienced stupor or delirium. No uniformity was reported with respect to the onset of effects, which ranged from 10 minutes to four hours, and with respect to the duration of action, which ranged from a minimum of four to five hours to a maximum of 24.

Most of the subjects compared nutmeg to marihuana. One said: "It made me feel light, like with a marihuana cigarette" though another explained: "One reefer will get you three times as high as nutmeg; it slows your actions down."

Weiss concludes that:

Doses of two to three tablespoonfuls of powdered nutmeg tended to narcotize the subjects against the unpleasant experience of incarceration, without a blurring of the boundaries between the self and the outer world. The effects were considered to be essentially similar to those of marihuana, although comparisons with heroin and alcohol were also cited. In most instances, a feeling of being transported aloft was experienced accompanied by a feeling of drowsiness in some cases and excitement or stimulation in others. . . .

Symptoms of physiological addiction were not reported. No positive correlation was obtained between the 'light-feeling' and the mood experience. Nor did the mood experience, be it gay or melancholy, for example, serve as an index as to whether inmates would prefer to promote social contacts or encyst themselves from them. It was also reported, in most instances, that the ability to enjoy certain pastimes was enhanced. In all instances of recall, thirst was increased, and hunger was largely diminished or unaffected. The various side effects reported were nausea, abdominal spasm, vomiting, constipation, tachycardia, insomnia, and drowsiness.

Two cases of acute brain syndrome, with psychotic reaction due to nutmeg intoxication, were reported. Each of the two subjects had chronically ingested powdered nutmeg over a long period. . . . Aside from the cases of nutmeg poisoning, the hallucinogenic effects reported were transitory and of brief duration.

Nutmeg has since been banned from the New Jersey State Prison kitchen, but Weiss has continued to gather facts on its use. He adds the following notes (62):

Inmates in the past [i.e., before the ban] would carry little match boxes in which they would store a supply of nutmeg (equivalent to one dose). They could then take the dose along with them to the shops in which they worked during the day. Users consider themselves to be more lively and cheerful. Thus, they feel they have dispelled their inner gloom. However, drug users seldom take nutmeg once they leave the prison since they consider its effects to be inferior to those of heroin or marijuana, whatever may be the similarity between them.

Weiss's article leaves no doubt about the use of *Myristica* in American prisons, despite the statement of the Federal Bureau of Prisons. Further information comes from an informant who was recently an inmate at a state prison. He writes:

During 16 months in a Massachusetts correctional institution, I knew three individuals who on occasion did use nutmeg as a snuff for 'kicks.' It was done only on weekends and widely dispersed as to time. At Synanon in California [a self-help addicts rehabilitation center] both nutmeg and mace have been used, but it is not a common problem. Two or three residents tried both nutmeg and mace while I was there. It was not considered Kosher by the Synanon family, it was considered a 'Mickey-mouse' deal, ridiculed rather than disciplined otherwise. There seems to be little history of the use of nutmeg or mace among prisoners other than addicts. I suspect it is because other drugs can be obtained too easily, even within correctional structures. The correctional officers admit to the validity of this statement.

Enoch Callaway, one of Truitt's co-workers, suggests (63) that officials know very little about nutmeg, because prisoners almost never admit to using it. Callaway also believes that large spice companies know much about the possibilities of nutmeg and mace but "pretend they don't." It is certainly true that most large processors of spices deny

knowledge of *Myristica*'s effects; according to Callaway, however, "they have to guard every shipment of mace and nutmeg they get," in order to keep them from being stolen by persons who consume them regularly.

Do bohemians and students use nutmeg as a narcotic? A Harvard undergraduate gives me the following information:

I recently received a visit from a beatnik acquaintance who smokes marihuana frequently and has tried other drugs. I mentioned to him that I knew someone who was writing about nutmeg as a narcotic, and he said, "We've known about that for years." He explained that he and many of his friends had tried nutmeg several times, taking it both as a snuff and by mouth. They did not think it was very good, however, because "you either get very sick or have a horrible experience." He said that people who like to "blow pot" [i.e., smoke marihuana] sometimes take nutmeg when they can't get their usual drug. He told me nutmeg was much used in India.

We happened to be in the kitchen, and my friend took me over to a spice cabinet. "Nearly everything in there will get you high," he said, "except for monosodium glutamate." He told me he occasionally smoked cinnamon sticks for their drug effect, and he recommended smoking paprika "if you want to have a powerful experience." He was afraid to try ginger, though, because he had heard it could be dangerously potent.

These startling capabilities of familiar substances are plausible, since all aromatics contain volatile compounds which affect the central nervous system. What is most interesting is the way each drug comes to offer a different experience to the narcotics-user—nutmeg can be "horrible," for example, or ginger "dangerously potent." Here is an illustration of the influence of psychological set on the drug experience. A person expecting horrible effects from nutmeg will probably get them. Likewise the reason prisoners in New Jersey had predominantly pleasant times with *Myristica* is probably that they expected nutmeg to help alleviate the boredom of prison.

A great many young people today expect (and get) "mindbroadening" experiences from a number of substances: the true hallucinogenic drugs, marihuana, morning glory seeds, airplane glue, certain cough syrups,⁴ and others. Is nutmeg on the list?

Callaway (63) maintains that jazz musicians "have been on to nutmeg for some time" but warns that they will not discuss it, except with people they know well. The same probably applies to most bohemians, addicts, and students who try out the spice; but if the rumors on these uses are also true, large numbers of young Americans have experimented, at least once, with nutmeg or mace. Very likely, most do not come back for a second try. Both spices are quite difficult to get down in the necessary amounts and nearly always cause a rash of unpleasant symptoms, even when they do produce pleasant changes of consciousness.

Payne's report (45) of 1963 is the only case of this type reported in the scientific literature. The two college men whom he examined had each taken two tablespoonfuls of powdered nutmeg in a glass of milk. "This procedure had been recommended by a 'beatnik' acquaintance as providing a mental state somewhat akin to ethanol intoxication without requiring the use of alcohol."

Experimentation with nutmeg may be widespread on American campuses. For example, in 1964, in the summer issue of a University of Mississippi student magazine there appeared an article titled "Nutmeg Jag," describing a nutmeg party attended by eight persons. One participant—a young man who consumed a whole standard-size can of the ground spice—reported afterward (64): "I felt as if I were in an echo chamber . . . my voice sounded vague and distant . . . it was like being drunk without the ordinary alcoholic effects. . . . Two friends of mine had told me about the 30-cents three-day drunk they had after taking nutmeg, so I tried it out of sheer disbelief." All of these nutmeg-eaters suffered extreme physical discomforts as a result of their party.

Probably most students who try nutmeg

⁴ Romilar's CF cough syrup, available without prescription, is the latest item to receive wide publicity as a psychedelic agent. It has been used especially by college students to induce euphoria and bizarre mental states. The syrup is sold in 3-ounce bottles, and one is told to drink 4 ounces to "turn on." Use of Romilar's has come to the attention of several physicians, who say that there is no pharmacological basis for these claims.

take it out of curiosity and do not come back for more than one intoxication. I have collected the following accounts from three students at eastern colleges:

1. "I heard about the effects of mace from a beatnik who visited our campus and induced a number of students to 'turn on' with two teaspoons of this spice stirred into water. (He did not mention nutmeg, by the way.) I didn't try it at the time, but a few months later five of us held a 'mace party' in my apartment. To the disappointment of all, we felt just the same three hours after drinking down the mace. Convinced that the alleged hallucinogenic properties of mace were imaginary, we separated and I went home to bed. I remember feeling somewhat lightheaded and having vague stomach pains before falling asleep, but I had no other symptoms until I woke up the next morning with a splitting headache, a burning thirst, and malaise. I later learned the other four had felt much the same on arising."
2. "A friend told me mace would cause visions, and I decided to try it. I had taken mescaline a few weeks before and liked that very much, especially the brilliant color visions. So I mixed two teaspoons of ground mace with fruit juice and swallowed it. A few hours later I began seeing visions when I closed my eyes—like those with mescaline but not nearly as intense. I was thirsty and lethargic all the next day and had a bad headache. I have no desire to repeat the experience."
3. "Five of us tried to get high by eating two whole nutmegs each. They are terrible things to try to chew up and swallow. We all had warm feelings in our stomachs immediately afterward and began sweating more than usual. One of us eventually had a pronounced reaction, but the rest of us noticed nothing unusual and gave up. The next morning we all had headaches, extreme dryness of throat and mouth, creaking joints, and dizziness. We felt just awful. One of us, however, had a different experience. He went back to his room to read, and exactly four hours after taking the nutmeg, he was suddenly overcome by a drowsiness so profound that he could hardly get up to turn off the light. As he fell into bed, he saw or had impressions of 'strange shapes floating' around him. He then sank into a heavy sleep from which he awakened

seven hours later to find that he could barely move. He was very dizzy and staggered when he tried to walk; also, he could not see clearly for several minutes. His mouth and throat were parched, and no amount of water he drank relieved the dryness. Two hours after he got up he again became drowsy and 'sank into a sort of trance state.' During this time he had a vivid impression that he was floating with his limbs separated from his body. Eight hours later, he was completely recovered."

As a final word on the use of nutmeg, there is the report of Truitt et. al. (51) that the practice of taking this plant product to produce "a syndrome comparable to alcoholic inebriety" is "not uncommon among alcoholics who are deprived of alcohol."

Psychopharmacology of Nutmeg: A Brief Note

Speculation on the psychopharmacology of nutmeg must be cautious, since, as Shulgin says (52), "the inability to assign to a single component of nutmeg the role of being the toxic factor makes a discussion of the mode of action, by definition, totally theoretical."

Nonetheless, a few findings are interesting. Truitt and a new group of researchers published a paper (65) in 1963, for example, which pointed out "a degree of structural resemblance between the chemical formula for myristicin and those of certain sympathomimetic amines." This similarity, together with nutmeg's stimulating action, suggested that myristicin and nutmeg may act as central monoamine oxidase (MAO) inhibitors. To test this hypothesis, synthetic myristicin and nutmeg oil concentrate were given to rats, and MAO inhibition was established by measurement of potentiation of tryptamine convulsions. Controls were run with two potent known MAO inhibitors, tranylepromine and iproniazid. By these methods, myristicin was shown to produce effects less potent than but parallel to those of the reference drugs. Myristicin was also found to antagonize reserpine ptosis and to increase brain 5-hydroxytryptamine—both of which are changes induced by other MAO inhibitors.

The authors emphasize that this is mere

circumstantial evidence, but they feel that nutmeg and myristicin are probably mild MAO inhibitors. Compared to other such compounds, their toxicity is quite low. The authors cite preliminary work with schizophrenic and depressed patients in which daily administration of ground nutmeg caused definite improvements. They conclude: "Further study is recommended for more direct evidence of nutmeg and myristicin as enzyme inhibitors and for their utility as anti-depressant drugs."

Shulgin, who has been concerned with the biochemistry of nutmeg's hallucinogenic action, assumes (52), for the moment, that the myristicin fraction of the oil (with its more than 25 per cent content of elemicin) is, indeed, the active principle. He notes that the metabolism of the aromatic ethers found in essential oils is "virtually unknown," except for a detoxication mechanism by which safrole is converted to piperonylic acid. This reaction indicates a capacity to oxidize an olefinic side chain. Shulgin suggests that, if this degradative process is "applicable to myristicin, or especially to elemicin, a theoretical intermediate, a vinyl alcohol, could undergo transamination producing the known psychotomimetic drug, 3,4,5-trimethoxy amphetamine (TMA). The recent description of the new, synthetic hallucinogen—3-methoxy-4,5-methylenedioxy amphetamine (MMDA)—which might be derived by an analogous process from myristicin, itself, is even more suggestive of a psychotropic function for this component of nutmeg (see Fig. 2) (16).

Thus far, human pharmacological data are inadequate to support the contention that myristicin is psychoactive or that it is an active principle of whole nutmeg. Shulgin concludes (52): "... some combination of factors in total nutmeg is capable of producing a psychotropic response: the structure of elemicin or myristicin wanting only an ammonia molecule to become a recognized mental agent must be accepted as at least an intriguing coincidence."

Conclusions

The seeds and arils of *M. fragrans* have powerful narcotic properties. In man, they have frequently caused serious but almost never fatal intoxications. Most Westerners

are ignorant of these toxic properties and know nutmeg and mace only as flavoring agents.

Both spices are used as narcotics, probably by significant numbers of people, although information on this use of *Myristica* is scarce. When taken deliberately as psychotropics, nutmeg and mace often cause reactions quite unlike those described in classical accounts of *Myristica* poisoning and much more like typical hallucinogenic drug experiences.

Thorough investigations of the history, sociology, and biochemistry of *Myristica* narcosis would be valuable from many points of view.

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Grains of Mediaeval India

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not linear in the succession of elements, i. e., they do not occur between one element and another, even though they have specific position. These are: ', which is simultaneous with vowels; intonations (of questions, etc.) which were probably simultaneous with utterances; roots and patterns, which are intercalated with each other, forming together part of the linear succession; the passive *u-a* morpheme which merely replaces vowels in other patterns; the jussive minus morpheme which drops phonemes from other morphemes.

The other relation which occurs in distribution is coexistence of one element with another in the same construction. In each level there are specific groups of elements which accompany others. One of the chief common features is the non-occurrence of the same element twice in succession. Repetition of an element does occur in the following cases: Two consonants may adjoin each other (but not the same consonant over). Two noun patterns (rarely, the same one over) may occur in one word. Several substantive phrases may adjoin each other in one clause (but rarely with the same initials, except *wa-*, *wa-* · -, 'o · -).

In the phonology, the vowels presented a more patterned system than the consonants. In the morphology, the verb patterns are more fully organized than the noun patterns. This is in part, but not wholly, due to the fuller grouping of morpheme variants for verbs than for nouns. However, the very fact that such grouping was possible for verbs indicates a close similarity be-

tween the distributions of verb patterns.⁵⁴ Note that most of the verb pattern variants were in the active *--u-* pattern.

Returning to the other method, the analysis of a construction into its component elements, the following relations are to be noted:

Nuclearity: Certain elements are always present in a construction, while others sometimes occur and sometimes do not. E. g., in a word the stem is always present; affixes may not be. The position of the nuclear element (that which is always present) relative to the others follows: In the word, the stem may have other elements before it or after it. In words having more than one stem, the main stem (the one which participates in the *i · m* concurrence, end of VI 2) is the first: *zaqné · -ha' · -ám · haḥ · -'akamí · m* 'the wise elders of the people.' In the phrase, the main word comes first, preceding the following words. In the clause the 0 position usually comes first.

Scope: Each element in a construction applies over a certain part of the construction. Thus, in *zaqné · ha' · -ám · ◇* above, the *e ·* (variant of *i · m*) 'm. pl.' applies to *zaqin*, not to 'am ·. In general, each element applies only to the construction level in which it occurs, and within it up to the position where it could occur again (even if it does not). Thus the ◇ 'm. sg.' after 'am · does not apply to *zaqin*, for in that position it could occur again, replacing the *e ·* as a member of *i · m*. Similarly the connective morphemes described in VI 3 apply only to the construction which they introduce.

⁵⁴ The weakest grouping of morpheme variants is that for *ma---*; a different treatment of this morpheme group would yield a slightly different verb system.

GRAINS OF MEDIAEVAL INDIA

HELEN M. JOHNSON

IT is a very usual convention in Sanskrit literature to refer to persons or things by a stereotyped number which sometimes refers to the actual number in the group and is sometimes probably only an arbitrary number, though certainly with some factual foundation. European Indologists have shown remarkably little curiosity about these groups, though they offer considerable information. Hemacandra, whose writings cover an almost in-

credible range, is conspicuously devoted to this practice. No doubt his contemporaries understood his allusions. It is difficult now, even for Indians, to explain them all.

As part of the wealth bestowed by Kubera on the native city of an Arhat, Hemacandra mentions "seventeen *dhānyas*." These I finally located in the commentary by himself to Hemacandra's *Abhidhānacintāmaṇi* 4. 234. They are given in a

quotation whose source I do not know. Grain (*dhānya*) is used in the wider sense of the word, as it is today in this country in statutory usage, which includes many plants besides the cereal grasses. I found also two lists of grains in Nemicaandra's *Pravacanasāroddhāra*, a work antedating Hemacandra by perhaps a century, with a commentary belonging to the end of the twelfth century. One list has twenty-four grains and the other twenty-five. The commentary to the *Kalpa-sūtra*, named *Subodhikā*, gives a list of twenty-four grains which is apparently copied from the *Pravacana*^o.

These lists combined should give a fair picture of agriculture in Western India in the twelfth century and the same grains are cultivated today, with the possible exception of flax.¹

1. *Vrihi*, *Oryza sativa*, rice in general, but specifically rice that ripens during the rainy season. Rice is probably indigenous to India. According to De Candolle, the cultivation of rice in India is subsequent to that in China, but it has been a valued crop since the classic period. It is the chief article of food over a large part of India at the present time. According to Dutt, there are

¹ Needless to say, botanists do not always agree on the classification of these grains. Roxburgh has 52 species of *Panicum*, some of which are classified differently by others. Popular usage and vernacular names do not recognize the scientific distinctions between very similar species. Also, vernacular names sometimes denote different plants in different provinces. Generally speaking, the lexicons are of little assistance in botanical matters. An exception is Molesworth-Candy's *Marāṭhi-English Dictionary* (MC), which is a mine of information too often disregarded. For Gujarātī I used Mehta's *Modern Gujarati-English Dictionary*; for Hindī Bate's *Dictionary of the Hindee Language*; and for Prakrit the *Ardha-Māgadhī Koṣa* (PE) and the *Pāia-sadda-mahāṇavo* (PH). I found most useful the following:

Dutt, *Materia Medica of the Hindus*. Calcutta, 1900. Forbes, *Oriental Memoirs*. London, 1834.

Hemacandra, *Abhidhānacintāmaṇi*. Bhavnagar, 1919.

Hemacandra, *Abhidhānacintāmaṇi*, ed. Böhrling and Rieu. St. Petersburg, 1847.

Imperial Gazetteer of India. 1909.

Memoirs of the Department of Agriculture in India, Botanical Series, especially Vol. IV.

Nemicaandra, *Pravacanasāroddhāra*. Bombay, 1922.

Roxburgh, *Flora Indica*. Calcutta, 1874.

Watt, *The Commercial Products of India*. London, 1908.

I have not been able to consult De Candolle at first hand. He is quoted from Watt and the *Imperial Gazetteer*.

three principal classes of rice: *vrihi*; *śāli*, reaped during the winter; and *ṣaṣṭika*, grown in the hot weather and reaped within sixty days of its sowing.

2. *Yava*, *Hordeum vulgare*, barley. This has been cultivated in some of its forms from the remotest times. Watt and MW think *yava* was originally a general term for 'grain' and was later restricted to barley, which must have been an important grain. It is still a very important crop in India.

3. *Masūra*, *Lens esculenta* (Roxb. *Cicer lens*), lentil. De Candolle thinks it was originally introduced into India from Egypt and says it was known as an article of food from the most ancient times. At present it is cultivated all over India.

4. *Godhūma*, *Triticum vulgare*, wheat. The cultivation of wheat is prehistoric. Dutt considers one variety indigenous to India. Literary references show that it has been known in India from an early date, though Watt speaks of the silence of European authors regarding the cultivation of wheat in India "until well into the 18th, if not to the beginning of the 19th century."

5. *Mudga*, *Phaseolus radiatus*, Linn., kidney-bean, 'green gram.' It is the Hindī *mūṅg* and Gujarātī *mag*. There is confusion in the lexicons and even in botanical works in the names for *mudga* and *māṣa* (see below). This is caused by Roxburgh's transposition of the original Linnean names. They are the ones now used by Indian botanists. *Mudga* is a valuable pulse, widely eaten.

6. *Māṣa*, *Phaseolus mungo*, Linn., kidney-bean, 'black gram.' Its most common vernacular name is the Hindī *urad*, Guj. *aḍad*. Watt says there are two varieties of *urad*: "one with large black seeds and the other with small greenish seeds, and these correspond very possibly with *P. mungo* proper and the variety *Roxburghii*." *Urad* is the most valued of all Indian pulses. It is extremely palatable and is one of the many excellent native foods ignored by Europeans. It is the main ingredient of a thin biscuit called *pāṇaṭa*, a staple article of food in Gujarat. *P. mungo* and *P. radiatus* are indigenous to India.

7. *Tila*, *Sesamum indicum*, sesame. De Candolle thinks the "plant was introduced into India

from Sunda isles at a period prior to the Aryan invasion." Watt says few, if any, of the early European travelers in India mention the plant or its oil. He says it is mentioned in the *Ain-i-Akbari* (1590), so it has been an "important crop for 300 years." Forbes² speaks of its extensive cultivation for oil in his time. Its oil and castor oil are the most esteemed, he says.

8. *Canaka*, *Cicer arietinum*, chick-pea, the common or Bengal gram of India. It is commonly used as food for horses. Its name comes from the Portuguese word for grain, *grão*. The word does not occur, so far as known, in the oldest Sanskrit or Prakrit literature, but does in *Suśruta*. Watt thinks it is not indigenous, but may have been introduced very early.

9. *Aṇava*. This presents difficulties. I have not been able to find any occurrence of the word except in these lists of grain and in the *Deśi-nāmamālā* (1. 52). Hemacandra defines it in the *Deśi*^o as 'śālibheda,' but it is probable that *śāli* here is grain in general. The PE takes it to be *yāvanāla*, *juār*, *Sorghum vulgare* (*Andropogon sorghum*, *Holcus sorghum*), great millet. *Juār* is one of the most important foods of India and it would be strange for it to be omitted from the list. The commentator to the *Pravacana*^o interprets it as 'yugandharī,' which I do not find quoted in any lexicon.

10. *Priyangu*, *Setaria italica* (*Panicum italicum*), Italian millet. Generally considered not indigenous, though cultivated from a very early time. *Kaṅgu* (a Sanskrit synonym, also), *cīna* and *rālā* are common vernacular names, according to Watt, but *cīna* is properly *P. miliaceum*.

11. *Kodrava*, *Paspalum scrobiculatum*, kodo millet. It is a native of India and is cultivated during the rainy season. Its extensive cultivation is accounted for by the fact that it will grow in very poor soil. It is used as a human food, but in some seasons is poisonous. Damp weather at harvest time, a damp season, and damp soil are said to produce the poisonous kind.

12. *Mayuṣṭhaka* (or *mayaṣṭhaka*), *Phaseolus acontifolius*, the aconite-leaved kidney-bean. This is eaten as a vegetable and *dāl*, and also is used as

a valuable fodder. Its Hindī name is *moth*, Guj. *maṭh*, and Forbes speaks of 'mutt' and gram being the most nutritious food for cattle.

13. *Śāli*, *Oryza sativa*, rice that is grown under water and reaped during winter. See *vrihi* above.

14. *Āḍhakī*, *Cajanus indicus* (Roxb. *Cytisus cajan*), pigeon-pea. Not a native of India. It seems not to be mentioned in any of the early Sanskrit works, but it occurs in *Suśruta*. It also occurs in the *Prajñāpanāsūtra*, so it was probably known in India by the first century A. D., perhaps much earlier. The pigeon-pea is cultivated extensively in all tropical countries, because it is available during the hot weather. Another Sanskrit name for the pulse is *tuvarī*, which occurs also in Hindī, though *arahar* is more commonly used. In Guj. *tuvar* and in Marāṭhī *tūar* are the usual names.

15. *Kalāya*, *Pisum*, pea. Watt calls attention to the fact that it must be distinguished from *Lathyrus sativus*, which it resembles. The confusion is of long standing, evidently. In his commentary to *Abhi*. 4. 236, Hemacandra gives *tripuṭa* as another name of *kalāya*. *Tripuṭa* seems to be *Lathyrus* certainly. *Maṭar*, which is properly the pea, is also applied to *Lathyrus*. In Gujarātī it seems to be used indiscriminately. The *Pravacana*^o interprets *kalāya* as *tripuṭa*, "others *canakika*" (p. 296) and describes it also as "*vrttacana*ka." Watt points out the importance of distinguishing between *Pisum* and *Lathyrus* and says: "The wedge-shaped pea of the present plant (*Lathyrus sativus*), flattened on two sides and marbled on the surface, should easily be distinguished from all the peas or pulses of India, except perhaps gram (*Cicer arietinum*); but while gram is somewhat triangular in section, it is prominently tapered below into a beak and is devoid of the marbling of *Lathyrus*." Watt's remarks explain the "*canakika* of others" and the "*vrttacana*ka" of the *Pravacana*^o.

16. *Kulāttha*, *Dolichos biflorus*, horse-gram. Watt says: "In popular works on economic products the horse-gram of Madras is viewed as *D. uniflorus*, and under either of these names (*D. uniflorus* or *D. biflorus*) a pulse is described as grown in almost every district in India, but chiefly in Madras and Bombay." This horse-gram of

² *Oriental Memoirs*, II, p. 36.

Madras must be distinguished from the Bengal gram, the *Cicer arietinum*, the true gram of India, and both must be distinguished from *Lathyrus sativus*. The chief use of *D. biflorus* is as a cattle food, but it is also eaten by the poorer classes, as it is a very cheap pulse.

17. *Śaṇa*, *Cannabis sativa*, hemp. Probably not an indigenous plant. There is considerable discussion whether *śaṇa* in the older works refers to the true hemp, *Cannabis sativa*, or to Bengal *san*, *Crotalaria juncea*. The most common current name for the true hemp is *bhaṅg*, a name that goes as far back as the *Atharvaveda*. Hemacandra gives *śaṇa* and *bhaṅga* as synonyms (*Abhi.* 4. 245, also *mātulānī*). Watt thinks *śaṇa* was in use to denote the true hemp at the time of early Mogul emperors. "But while *śaṇa*—a fibre—occurs in the Institutes of Manu (probably of date 100 to 500 A.D.) and in some of the later Sanskrit works, it apparently denotes *Crotalaria* rather than *Cannabis*. It would thus seem as if the word *śaṇa* to denote the true hemp had been a comparatively modern usage." Watt also quotes from Dr. K. Garde of Poona, who says: "Later Sanskrit commentators and lexicographers interpret *bhaṅg* as *shana*, the Bengal sunn plant (*Crotalaria juncea*), which has been known in India from time immemorial as a plant-yielding fibre." I can not follow this reasoning. Since *bhaṅg* has always denoted the true hemp, it would seem that the commentators were interpreting *śaṇa* as *Cannabis*, not interpreting *bhaṅg* as *Crotalaria*. I think there can be no doubt that Hemacandra intends *śaṇa* and *bhaṅga* to refer to the true hemp, as the plant referred to is included in this list of grains. *Cannabis* produces edible seeds and the well known narcotic. *Crotalaria* has no edible products. Roxburgh quotes Hardwicke as saying that in the mountains above Hardwar a coarse cloth is made from the bark of *Cannabis*.

The *Pravacana*^o lists these, with the exception of *aṇava*, *caṇa* and *mayuṣṭhaka*. In addition it names:

1. *Yavayava*, a kind of barley.
2. *Cavalaka* (Pk. *cavalaya*). *Cavalaka* or *cavala* is not quoted in the Sanskrit lexicons. It is obviously the Marāṭhī *cavalā*, the Gujarāṭī *colā*, which are names for the *Vigna catjang* (*Dolichos*

sinensis), the cow-pea. *Barbatī* and *lobiyā* are other common vernacular names. There is some popular confusion between *Dolichos lablab* and *V. catjang*. Through *lobiyā* is applied to *D. lablab* and loosely to any pulse by Indian market gardeners, it especially denotes the present plant, according to Watt, and he reserves the name for *V. catjang*.

3. *Kṛṣṇacaṇaka*, black chick-pea. Watt speaks of various forms of the chick-pea, indicated by the different colors of the pea. See *caṇa* above. However, the *Pravacana*^o commentary describes it as round without a point.

4. *Valla*, *Dolichos lablab*, the climbing bean. This is the Gujarāṭī *vāl*, (Watt wall). Another Sanskrit name is *niṣpāva*. Watt thinks it is probably indigenous. It is a garden plant and is not a regular field crop.

5. *Atasī*, *Linum usitatissimum*, common flax. *Umā* and *kṣumā* are synonyms. (*Abhi.* 4. 245). Watt calls attention to the fact that, though the cloth made from *kṣumā* is regularly interpreted as 'linen,' flax was not used when he wrote (about forty years ago) to make cloth, but only to produce linseed and linseed oil. He thinks *kṣumā* may have originally denoted some other fibre. Forbes³ speaks of flax being cultivated by many villages for the oil.

6. *Laṭva* (Pk. *laṭṭa*), *Carthamus tinctorius*, safflower. Though better known for its dye, safflower also produces oil and edible seeds, and the young shoots are eaten.

7. *Koradūṣaka* (*kodūsaga*), a kind of *kodrava*. See above, no. 11. Roxburgh gives *koradūṣa* simply as a synonym of *kodrava*, but, as the commentator takes them to be different and as they both occur in one list, they are probably different varieties.

8. *Baraṭhī*, the *Pravacana*^o's commentary's interpretation of the Pk. *varaṭṭa*. It is said to be

³ Oriental Memoirs, II, p. 36. In this connection a news item from India is of interest. In Indian Information, August 15, 1940, published by the Government of India, there is an announcement of the approval of a government scheme for growing flax. Seed was purchased in Holland. Guarantees to cultivators are designed to discount risks attendant on the growing of a *new and unfamiliar crop*. (Italics mine.)

'well-known.' It is presumably the Marāṭhī *baraṭi*, which Gamme says is *Setaria glauca* as a grain crop; as a grass crop it is called *bhadli*. MC defines *baraṭi* as a 'grass-grain included amongst *trṇa-dhānya*. It is white and small and it resembles *varī* or *rālā*.' *Varī* is *Coix barbata*, and *rālā* *Panicum italicum*, according to MC. But Watt gives 'vari, wadi' as vernacular names of *Panicum miliaceum*.

9. *Siddhārtha*, *Brassica campestris*, Indian colza or sarson. Hemacandra (*Abhi*. 4. 246) gives *śvetasarsapa* as a synonym, and *siddhārtha* is called 'white mustard' by the lexicons. But it is not *Brassica alba*. Sarson is widely cultivated in India.

10. *Rālaka*, 'a kind of *kaṅgu*,' *Setaria italica*, M. *rālā*. See *priyaṅgu* above.

11. *Mūlaka*, *Raphanus sativus*, radish. Watt says that it is cultivated throughout the plains of India and in the Himalayas up to 10,000 feet. He does not say whether it was indigenous or not, nor when it was introduced. The PH cites it from the *Prajñāpanāsūtra*, so it must have been known for about 2000 years, at least.

The third list, *Pravacana*^o 1004 f., which appears to be copied in the commentary to *Kalpasūtra* 89, adds four new grains:

1. *Ṣaṣṭika*, sixty-day rice. See *vrihi* above.

2. *Tripuṭaka* (*tiugaḍa*), *Lathyrus sativus*, chickling-vetch. This is the pulse with which *Pisum* is often confused. See *kalāya* above. It is generally fed to cattle but among the poor it is eaten in the place of the better pulses. If eaten continuously for some time, it causes a form of paralysis, Lathyrism. Its common vernacular names are *teora*, *tiura* and, in Bombay, *lāṅg*.

3. *Ikṣu* (Pk. *ikkhu*, *ucchū*), *Saccharum officinarum*, sugar-cane. Very extensively cultivated. References to fields of sugar-cane are very common. Watt thinks that sugar-cane cultivation originated in South Asia, if not in India, but it has never been found wild in India, nor any other place.

4. *Dhānyaka*, *Coriandrum sativum*, coriander. Cultivated over India in the cold season.

Although this list adds only four new grains, it furnishes a number of different names for the same grains. *Harimantha* occurs, which Hemacandra

(*Abhi*. 4. 237) gives as a synonym of *caṇa*. The *Pravacana*^o commentator, however, specifies *kṛṣṇa-caṇaka*. According to Watt, *harimandakam* is used at present in Tamil for the *Cicer arietinum* (*caṇa*). In this list *niṣpāva* (*nippāva*) is *Dolichos lablab*; *śilinda* is Hemacandra's *mayuṣṭhaka*, *Phaseolus acontifolius*; *rājamāṣa* is another name for *Vigna catjang*. Hemacandra's *aṇava* occurs in this list (*aṇua*). Assuming that *aṇava* is *Sorghum vulgare*, there are only two grains omitted from these lists that one might expect to be included: *cīna* and *śyāmāka*. Though both these names occur in the *Abhidhānacintāmaṇi*, they may not have been widely cultivated at that time. Both of them are considered inferior grains, which may also have been a reason for their omission.

Cīna is generally identified with *Panicum miliaceum*, common millet. But the Gujarātī lexicon defines *cīno* as 'a poor kind of produce, the third crop from a field in the same year,' and calls it P. miliare. Watt says that P. miliare (little millet) forms together with *kodon* (*kodrava*) the crop generally taken from the poorest land in the village. Incidentally, Roxburgh says of both P. miliaceum and P. miliare that they "are generally cultivated on an elevated, light, rich soil." Watt gives *cīna* as one of the vernacular names for S. italica as well as P. miliaceum and Gamme says that *cīno* is used in Sind for a variety of S. italica.

Śyāmāka, P. frumentaceum, poor-man's millet, is called by Hemacandra 'jaghanyo *vrihiḥ*' (*Abhi*. 4. 242). It is the *baṇṭi* of Gujarat. It is the quickest growing of all millets and in some localities can be harvested six weeks after sowing. It is consumed chiefly by the poorer classes. It is mentioned in the Bower manuscript.

Two other grains, which are widely cultivated at the present time, can not be identified with any of the grains in these lists nor have they any Sanskrit names, so far as I can ascertain: Eleusine coracana, *rāgi*, a small millet, and Pennisetum typhoideum (Roxb. *Panicum spicatum*), *bājṛā*, spiked millet. Roxburgh speaks of both of these as cultivated extensively on the Coromandel coast. They were both well-known in Gujarat in the time of Forbes. However, he calls Eleusine coracana 'nutchnee,' the Coromandel term, or 'boutah' (?).



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SOME ETHNOBOTANICAL NOTES FROM NORTHEASTERN INDIA

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This paper deals with the ethnobotany of 48 plants from Northeastern India. The information was derived from specimens deposited in the herbarium of the Botanical Survey of India at Shillong (ASSAM). Vernacular names of plants and voucher specimens are mentioned. The importance of ethnobotanical studies of herbarium materials is discussed.

The northeastern region of India has more than half of its area under hilly tracts. A large part of the region is botanically under-explored or even unexplored. Population density in the hilly regions is very low. Most of the area lacks industrialization and communications and, consequently, is under-developed. The local inhabitants subsist on limited agriculture and local products of plant and animal origin. The area is, thus, very interesting ethnobotanically.

The relationship between the indigenous people of the region and the vegetation is both advantageous as well as detrimental to the plant wealth. The impact of man on the vegetation for the development and maintenance of plant wealth is common knowledge. Man has been growing and improving plants for his own benefit for ages. Man has also caused immense, often irreversible damage to the plant wealth through land-clearing for agriculture, townships, road-building, industrial estates, etc. Man has also disturbed the forest ecosystem through selective cutting or collection of certain species. This relationship between man and plants forms the subject of ethnobotany. One very interesting and practical aspect of ethnobotany has been the study of uses of plants by existing tribal populations.

MATERIALS AND METHODS

While discussing the various methods of ethnobotanical studies Schultes (1960), Von Reis (1962) and Jain (1967) have shown that plant collections in herbaria are a very rich source of ethnobotanical information. For the present study, selected collections housed in the herbarium of the Botanical Survey of India at Shillong (ASSAM) were studied, and the information on economic uses, as noted by plant collectors in the field, was extracted. These notes were compared with published literature on economic plants of India (Kirtikar & Basu, 1935; Wealth of India, 1948–72; Dastur, 1951; Chopra et al., 1956, 1974; Jain, 1965, 1968; and Jain & Tarafder, 1970).

Only those economic uses which do not seem to be well-known or recorded in economic botany literature are described. The medicinal plants reported need to be studied chemically and pharmacologically for their contents and efficacy. The plants reported as edible are significant as they serve for subsistence in times of emergency.

Economic uses extracted from herbarium records have several advantages over other sources of information (Von Reis, 1962). The exact plant on which the information is based is available, and, thus, its identity can be ascertained. The locality of the plant and origin of the information are known, and the data can be confirmed.

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PLANTS OF ECONOMIC USE

In the following enumeration, the plants are arranged alphabetically according to their botanical name. Where necessary, this is followed by its synonym. Subsequently, the vernacular name and the language of this name, when known, are provided. The language abbreviations are explained below.

A = Assamese; Ab = Abor; Ar = Arong; B = Bengali; Bh = Bhutia; D = Dafla; G = Garo; H = Hindi; K = Khasi; Ka = Kachari; Km = Kamrupia; Ku = Kuki; L = Lushai; M = Mishmi; Me = Meches; Mr = Miri; Mk = Mikir; Mani = Manipuri; N = Nepali; Ng = Naga; Syl = Sylheti.

Plant uses, names of the states where these uses were recorded, and herbarium (ASSAM) accession numbers are given.

1. *Acanthopanax trifoliatum* (L.) Voss; syn. *A. aculeatum* Seem. (Araliaceae). "Kenkut" (Mr). Young shoots are cooked and eaten. Fruits yield a dye used as ink. (Arunachal). 12492.
2. *Antidesma diandrum* (Roxb.) Roth (Euphorbiaceae). "Holos" (A); "Aburok" (G); "Dieng-japeu" (K); "Abortenga" (Km); "Ing-sum-arong" (Mk). Fruits and leaves are edible. (Assam). 26853.
3. *Argyrea nervosa* (Burm. f.) Boj. (Convolvulaceae). "Jatapmasi" (K); "Jamang-pi-danok," "Soh-ring-kang," "Chamang-pins-dansaw" (Mk). Plant is considered to be medicinal in Mikir hills. (Arunachal, Assam, Meghalaya). 19976.
4. *Begonia palmata* Don; syn. *B. laciniata* Roxb. (Begoniaceae). "Japeu-nybba" (K). Leaves are cooked and eaten. (Meghalaya). 12167.
5. *Begonia rubrovenia* Hook. (Begoniaceae). "Jahoksier." Stem is edible. (Meghalaya). 46301.
6. *Boenninghausenia albiflora* (Hook.) Reichb. ex Meissn. (Rutaceae). "Ymari" (Bh). Medicinal; roots are powdered, made into paste with water and applied to worm-infested wounds. (Arunachal). 23508.
7. *Brassaiopsis palmata* Kurz (Araliaceae). Eri silkworms feed on the leaves. (Assam). 12575.
8. *Buddleja asiatica* Lour. (Buddlejaceae). "Agia-chita." Leaves are used for fomentation on inflammations, and in the preparation of the domestic medicine "Low pani." (Arunachal). 19408, 15327.
9. *Buddleja macrostachya* Benth. (Buddlejaceae). "Ja-long-krem." Bark chewed with pan. (Meghalaya). 19436.
10. *Canarium resiniferum* Brace ex King (Burseraceae). "Satraiphang" (Ka); "Berow-thing" (Ku); "Silum pakiak" (Mr). Bees seem to be fond of the resin before it hardens. It is sweetish and very oily. (Assam). 4485.
11. *Cardamine macrophylla* Willd. (Brassicaceae). Leaves are used as vegetable. (Arunachal). 9651.
12. *Casearia graveolens* Dalz.; syn. *C. glomerata* auct. non Roxb. (Bixaceae). "Tel-bhurki" (A); "Bolong-miandok" (G). Leaves are used as vegetable by Garos, Rabhas and Kacharis. Twigs and leaves are cooked and eaten. (Assam, Meghalaya). 1413, 1417.
13. *Cirsium involucreatum* DC. (Asteraceae). "Soh-chlia" (K); "Sumori kanra" (N). Seeds are aromatic, eaten by the Khasis; young shoots are eaten by the Nepalese. (Meghalaya). 15964.
14. *Clematis montana* Buch.-Ham. ex DC. (Ranunculaceae). Roots are very effective against cough and cold. (Sikkim). 9289.
15. *Cleome viscosa* L. (Cleomaceae). Seeds are used for flavoring curry. (Assam). 11222.

16. *Codonopsis parviflora* DC.; syn. *Campanumaea parviflora* (DC) Benth. (Campanulaceae). "Ja-tyndong" (K). Leaves are cooked and eaten. (Meghalaya). 16291.
17. *Crataeva nurvala* Buch.-Ham. (Cleomaceae) "Barum" (A); "Jong-sia" (G); "Sibe-dotki" (Mr); "Mibonju" (Ka); "Nagas entar" (Ku). Shoots are cooked and eaten; fruits are reported to be edible. (Assam). 1100.
18. *Croton roxburghii* Balak.; syn. *C. oblongifolius* Roxb. (Euphorbiaceae). "Marthu-arong" (Mk). Used for fermenting liquor. (Assam). 26989.
19. *Croton tiglium* L. (Euphorbiaceae). "Runi-bih." Fruits are used for poisoning fish. (Assam). 27038.
20. *Cordia grandis* Roxb. (Ehretiaceae). "Kotra" (Km); "Kala-uja" (Syl). Gum is used as adhesive. (Assam). 19768.
21. *Cryptolepis sinensis* (Lour.) Merr. (Periplocaceae). Thin branches are used for weaving fishing traps. (Assam). 19100.
22. *Cyathocalyx martabanicus* Hook. f. & Th. (Annonaceae). "Hreiroth" (L). Ripe fruit is edible. (Assam). 700.
23. *Daphne bholua* Ham. ex Don; syn. *D. cannabina* Wall. (Thymelaeaceae). Roots are used for intestinal troubles. (Sikkim). 17932.
24. *Delphinium altissimum* Wall. (Ranunculaceae). "Bad-soh-plih-rit." Plaster is applied to glandular swellings. (Meghalaya). 123.
25. *Desmodium laxiflorum* DC. (Papilionaceae). "Bhutu ham" (Mk). Roots and leaves are medicinal. (Meghalaya). 7625.
26. *Elaeocarpus floribundus* Bl. (Elaeocarpaceae). "Jolpai" (A); "Ron" (Ku); "Charphal" (Mani); "Ok-hi-simingli" (Mk). Fruits are edible. (Meghalaya). 3125.
27. *Elatostema dissectum* Wedd. (Urticaceae). Leaves and fruits are edible, either raw or cooked. (Arunachal). 18915.
28. *Ficus auriculata* Lour. (Moraceae). Khasis use the sprouts as vegetables. (Arunachal). 45547.
29. *Ficus prostrata* Wall. ex Miq. (Moraceae). Bark is eaten with betel leaf. (Arunachal). 18722.
30. *Garcinia cowa* Roxb. ex DC. (Clusiaceae). "Kurz-thekera" (A). Fruit is edible. The acid fruit is used for external application in obstinate cases of headache. (Meghalaya). 37453.
31. *Gaultheria fragrantissima* Wall. (Ericaceae). "Jalan-thrait" (A). Leaves are crushed, mixed with water and the juice drunk to cure cough. (Assam). 31262.
32. *Gaultheria nummularioides* Don (Ericaceae). Fruits are eaten by Bhutias. (Arunachal). 14462.
33. *Gnetum montanum* Mark.; syn. *G. scandens* Roxb. (Gnetaceae). "Jagin-griube" (Mr). The seed is chewed as a substitute for areca-nut. (Assam). 37086.
34. *Hedyotis diffusa* Willd.; syn. *Oldenlandia diffusa* Roxb. (Rubiaceae). "Man-jaluk" (A). Eaten with fish after child birth. (Assam). 43736.
35. *Hodgsonia macrocarpa* (Bl.) Cogn. (Cucurbitaceae). "Topoguli" (A); "The-boulata" (A); "Thai-bai-doukha" (Ka); "Ghiu-phal" (N). Silk worms feed on the leaves. (Assam). 11932.
36. *Indigofera tinctoria* L. (Papilionaceae). "Ymari" (Bh). Medicinal; powdered roots made into a paste with a little water are applied to worm-infested wounds. (Arunachal). 11186.
37. *Natsiatum herpeticum* Buch.-Ham. ex Arn. (Icacinaceae). Plant is used for treatment of influenza. (Meghalaya). 10713.
38. *Pericamphylus glaucus* (Lamk.) Merr. (Menispermaceae). "Baral pate" (N). Fodder for cattle, goats, etc. (Assam). 850.

39. *Picrasma javanica* Bl. (Simaroubaceae). Fruit is medicinal in certain digestive disorders. (Assam). 34750.
40. *Piper diffusum* Vahl (Piperaceae). "Soh-myret" (K). Fruit is used as a condiment. (Meghalaya). 23877.
41. *Piper gamblei* C. B. Cl. (Piperaceae). "Randhale" (D). Leaves are applied to swellings. (Arunachal). 29263.
42. *Potentilla fulgens* Hook. (Rosaceae). The roots are chewed with pan. (Meghalaya). 9929.
43. *Securinega virosa* (Roxb. ex Wall.) Pax et Hoffm. (Euphorbiaceae). "Nyeze" (Bh); "Timmu" (N). Fruit is mixed with pulses and eaten to relieve digestive disorders. (Arunachal). 23776.
44. *Uvaria crinita* (L.) Desv. (Papilionaceae). "Dieng-kha-riu" (K). Roots are used to intoxicate or kill fish. (Meghalaya). 7541.
45. *Uvaria hamiltonii* Hook. f. & Th. (Annonaceae). "Latkan" (B); "Bolong" (G). Pulp is edible, tastes like custard apple. (Tripura). 9441.
46. *Zanthoxylum acanthopodium* DC. (Rutaceae). Fruit is very pungent and spicy. The hill tribes use the fruit as a spice in curry. (Arunachal). 10524.
47. *Zanthoxylum armatum* DC.; syn. *Z. alatum* Roxb. (Rutaceae). "Jainu." Local people use the fruit in curries. Bhutias use the dried aromatic fruit as spice, it leaves a tingling sensation in the tongue. (Arunachal, Meghalaya). 45866, 10520.
48. *Zanthoxylum limonella* (Dennst.) Alst. (Rutaceae). "Hanjor" (Mk); "Mala-phang" (Ka). Leaves are used as vegetables. Spines are of medicinal value. Articles of ornament are prepared by the Kacharis. The wood is very strong. (Assam). 3965, 10534, 3968, 3972.

ANALYSIS OF PLANTS ACCORDING TO USES

- (i) *Plants used as foods, fodders, food adjuncts, spices and flavorings*: 1, 2, 4, 5, 8, 9, 11, 12, 13, 15, 16, 17, 18, 22, 26, 27, 28, 29, 30, 32, 33, 38, 40, 42, 45, 46, 47, 48.
- (ii) *Plants reported to possess medicinal properties*: 3, 6, 8, 14, 23, 24, 25, 30, 31, 34, 36, 37, 39, 41, 43, 48.
- (iii) *Plants used for miscellaneous purposes*: 1, 7, 10, 19, 20, 21, 35, 44, 48.

In total 28 species are reported to be used as food, fodder, spice and food adjuncts; 16 species are reported to be of medicinal value, and nine species are accredited with other miscellaneous uses, such as hosts for silkworm, fish poisons, etc. This enumeration is in no way exhaustive. Many more specimens in the herbarium bear valuable notes on uses. However the uses of these plants are indicative of the intimate dependence and relationship of the people of the hilly regions with the forest vegetation in their vicinity.

Under adequate direction, collection of indigenous plants can be done by local forest dwellers. This can become a reasonably inexpensive source of plant collections as well as a source of income to the usually poor villagers in forest areas. Furthermore, once the people in the forest areas know that the numerous wild-growing herbs, shrubs or trees in their vicinity can bring some remuneration to them, they will be actively interested in protecting the vegetation from avoidable destruction.

What needs to be done, therefore, is:

- (1) to study more herbarium specimens to retrieve notes on their economic uses,
- (2) to record the data on the economic uses of plants among the primitive societies, particularly in remote forest areas,

- (3) to assess this information through scientific methods for real utility,
- (4) to organize economic collections of these minor forest products, and
- (5) if possible, to either arrange for processing of raw materials in the vicinity of forest areas, so as to bring more economic aid to the region or to transport these forest products to appropriate processing centers.

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Ethnobotany of the Mikirs of India

Author(s): S. K. Jain and S. K. Borthakur

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Ethnobotany of the Mikirs of India¹

S. K. JAIN² AND S. K. BORTHAKUR³

The Mikirs living in Karbi-Anglong district in northeastern India depend on the natural plant resources of their neighbouring forests for much of their food, all their medicine, and for other material cultural needs and recreation. They, of course, use many plants in their magico-religious ceremonies. The area has remained botanically and ethnobotanically unexplored until the recent studies were initiated in 1976. Many heretofore unknown or little-known uses of plants have been recorded. However, much remains to be learnt from this region regarding the use of plants for human welfare.

The Mikirs are an aboriginal people inhabiting the Karbi-Anglong district in the hilly tract, known as Mikir Hills between 25°30'–26°41'N and 92°70'–93°52'E, in the state of Assam in northeastern India. Little is known about the history of early settlement of the Mikirs in this region. It is believed that like other tribes of northeastern India, they belong to the Mongolian race (Chatterji, 1950; Gait, 1926; Guha, 1951). Due to constant association with and dependence on forests, they have intimate knowledge of plants and their utility. This association is reflected also in their language, religion and culture.

The multiple uses for which plants are employed by the tribals are often not known outside their community. With the rapid spread of modern technology into these areas, acculturation of tribes is taking place fast. It is for the purpose of recording the uses of plants in folklore and folklife among the Mikirs, that the ethnobotanical studies reported here were initiated in 1976.

This paper presents briefly the information obtained during 2 years of field work in selected habitats of the Mikirs.

The aim of the study was to (a) list the species of plants used by Mikirs, (b) discover the purpose for which they are used, (c) record the Mikir names for these plants, (d) determine the importance of these plants for the Mikirs as food, medicine, local rural technology and other material culture, and (e) study the role of plants in religion and language.

FIELD WORK

The general procedure for gathering data was the same as described by Jain (1963, 1964, 1965, 1967); it consisted of either interviewing the informants, or witnessing uses of plants during stays in their villages. Voucher specimens were collected for all the plants used by the Mikirs; they were identified and preserved for future reference in recognised herbaria (CAL and ASSAM).

During field work, the local adivasis or informants were requested to accompany us to the forest and to identify the plants they use. Alternatively, these plants were collected and queries were made as to how they were used. If the information was inadequate, it was necessary to collect plants with other inform-

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ants of the same tribe familiar with the plants. Tribal markets were visited for observation of the forest produce sold or bartered. When the medicinemen were respected and given a leading role in discussions, they spoke out without reservation. To ensure authenticity of statements, discussions were made on the same plants with different informants at several places.

FOOD

Although rice constitutes the major food grain of the Mikirs, bulbs, rhizomes, leaves and shoots of various native plants supplement their food. The importance of these supplementary foods depends upon availability and occurrence in the particular area and season. For example, leaves of *Gnetum gnemon* L. ('Hanthu'*), which occurs in the eastern part of the district, are largely used as vegetable. Leaves of *Rhynchosyris ellipticum* (Wall. ex Dietr.) A. DC. ('Mahak') is an important vegetable during early spring, but is not used at all in other seasons when it develops a bitter taste. Gathering of food plants and their processing are generally regarded as work of women; men help them with the major crops and in the preparations for feasts.

Rhizomes and bulbs are generally dug with an instrument with a blade resembling a pickaxe. A specially made bamboo basket ('Hak-chili') is used as a container. Usually, these are carried on the back or over the shoulder with a belt made of bark fibre (Fig. 1). A few plants are eaten raw, but mostly they are used after cooking. Some rhizomes such as *Alocasia macrorrhiza* Schott. ('Han-sesau') are baked or roasted over an open fire. Mostly foods are prepared by simple boiling; fats are not used in this cooking. These people prepare an intoxicating drink by fermenting rice and then distilling it (Fig. 2).

MEDICINE

Herbal medicine is important in the life of the Mikirs. Knowledge of medicinal herbs and treatment is often limited to a few members of the community, although remedies for common ailments like cuts, pains and fevers are known to most of the tribals. There is a strong belief among Mikirs that there is a link between disease and supernatural powers. Complicated diseases and ailments are attributed to the spell or curse of an evil spirit or to the violation of some god or to the work of hostile sorcerers. Minor ailments are regarded as natural and not produced by the wrath of supernatural powers.

Diagnosis always involves some sort of magical performance, but little actual examination of the patient. If sickness is prolonged or severe, a brother or close kinsman of the patient arranges for the service of a mystic-priest known as 'Uche' (feminine-'Uchepi'). There are two grades of 'Uche'—the lower, whose craft is acquired merely by instruction and practice ('Sang-Kelang-abang'), and the higher, who are invariably women and claim to work under the inspiration of divine powers ('Laudet' or 'Laudetpi'). On less important occasions, the former are considered sufficient, but for serious sickness, the latter are called in.

The 'Uche' determines whether the patient is under the spell of an evil spirit, is under the anger of a god, is suffering from enemy sorcerers or he has some

* Tribal names are given within single quotation marks.

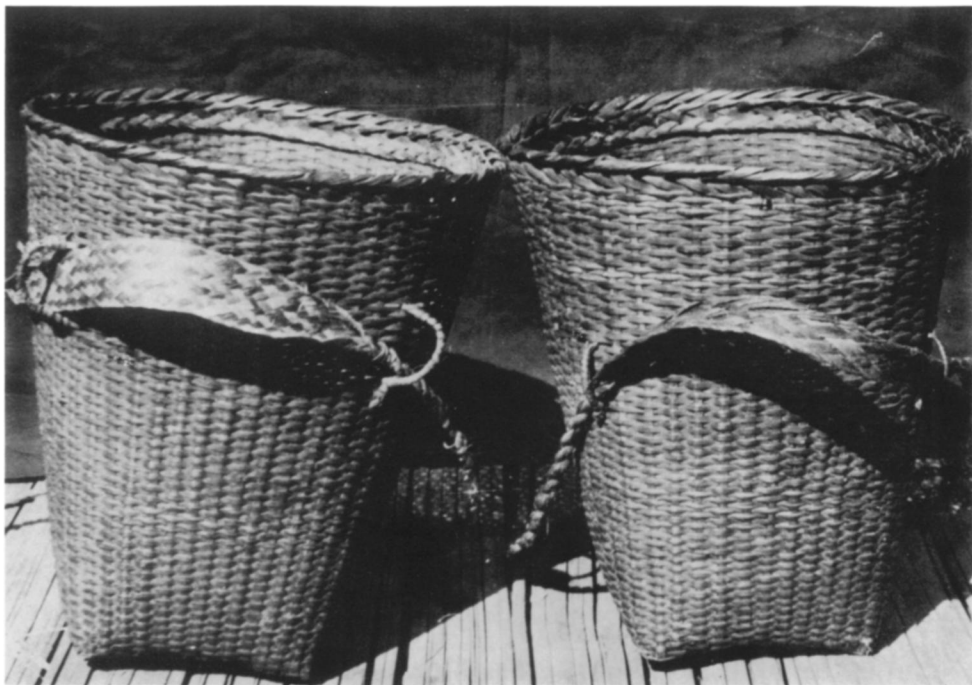


Fig. 1. Bamboo baskets with shoulder straps.



Fig. 2. The native apparatus for distilling fermented rice.

sort of actual physical ailment. At this stage, the service of the 'Uche' is over, and the treatment follows according to his/her instructions.

Exorcism and animal sacrifice play an important role in the treatment. Propitiation of a god or the spirit as determined by the 'Uche' is the first phase of treatment and is performed by another category of priests called 'Kuru.' It is only after the completion of the first phase that the second phase of the treatment, that is, the application of medicine and the service of the medicineman 'Thekere' is sought. Sometimes oracles are considered as an important part of the treatment, and medication is accompanied with recitation of oracles.

Some of the plants employed by the Karbis in medicine are mentioned below:

Aesculus assamica Griff. Hippocastanaceae.

'Phak-lang-jam-araung.' Leaves are pressed and the juice is dropped into ear for ear complaints.

Crataeva nurvala Buch.-Ham. Capparaceae.

'Mir-chak-chu.' Fresh juice of the bark is given for urinary complaints; it is also useful as a tonic for general weakness and given to women after childbirth.

Crotalaria pallida Aiton. Papilionaceae.

'Thang-kur.' Poultice of root is applied to painful swelling of joints; its leaf-juice is a vermifuge.

Dysoxylum binectariferum (Roxb.) Hk.f. ex Bedd. Meliaceae.

'Khrang,' 'Khrang-kelauk-araung,' 'Naupak-ban.' Seeds are pounded and given with hot water in leprosy; powder of the dry seed is applied externally on leprosy and foul ulcers.

Erythrina stricta Roxb. Papilionaceae.

'Parse-araung.' Flowers are pounded and given as tonic. A lotion made by burning the wood is applied on facial inflammation.

Erythrolpalum vagum Mast. Olacaceae.

'Han-resim,' 'Laujanthu.' Decoction of mature leaves is given in malaria.

Garcinia pedunculata Roxb. Clusiaceae.

'Ampri-araung,' 'Pranpi-araung.' Infusion of dry pericarp in cold water is useful in constipation, griping pain of stomach and in indigestion.

Gmelina arborea Roxb. Verbenaceae.

'Phang-araung,' 'Phang-kurbau,' 'Phang-laubaung.' Bark decoction is given for stomach ailments; extract of the root is blood purifier, while leaf infusion is carminative.

Leea indica (Burm. f.) Merrill. Leeaceae.

'Ladepu.' Root extract with honey is used as an expectorant.

Micromelum integerrimum (Roxb.) Wt. et Arn. ex Roem. Rutaceae.

'Enghat-laung-hing,' 'Khrang-kelau,' 'Theng-hanse.' Extract of the stem is given to hasten the process of delivery; its decoction is given in dysentery.

Morinda angustifolia Roxb. Rubiaceae.

'Jang-tarlaung,' 'Kanthu-araung,' 'Tarlaung-araung.' Leaf decoction is rubbed on forehead or taken orally in giddiness.

Mucuna nigricans (Lour.) Steud. Papilionaceae.

'Tarma-lang-baung.' Poultice of the seed is rubbed on neck for throat pain, while pounded seed with ginger is given for fever with cough.

Murraya paniculata (L.) Jack. Rutaceae.

'Deijir-araung,' 'Dengjer-araung.' Juice of the root is given for labour pain and a poultice is rubbed on body-pain.

Picrasma javanica Bl. Simaroubaceae.

'Chap-alau,' 'Sheng-lauksau.' Decoction of bark is febrifuge and given in dysentery, while the powder of the dry bark with cold water is useful in stomach pain.

Salmalia malabarica (DC.) Schott. et Endl. Bombacaceae.

'Parkaung-araung.' Root-extract is given for cough and also for urinary complaints, while the resin or powder of dry root bark is given for nocturnal pollution.

Sterculia villosa Roxb. Sterculiaceae.

'Chikaung-araung,' 'Jinje-kaung.' Decoction of bark is given for constipation, whereas a paste with ginger is applied on hydrocele.

Rhamnus nepalensis Wall. ex Roxb. Rhamnaceae.

'Nakaling-araung,' 'Rikang-ak-ik-araung.' Powder of the fruit with sesamum is used as snuff for headache, while powder of the seed is a vermifuge.

Vatica lanceaefolia Bl. Dipterocarpaceae.

'Janmi-rang-rang,' 'Mir-gaum-phaur,' 'Mir-kum-phaur.' Extract of the bark is given in dysentery.

OTHER CULTURAL AND TECHNOLOGICAL USES OF PLANTS

Mikir houses are built on raised platforms, a characteristic feature of tribal housing in northeastern India (Fig. 3). The major portion of the house, viz., roof, wall and platform, is made from bamboo. The most commonly used species are: *Bambusa nutans* Wall. ex Munro ('Chak'), *B. pallida* Munro ('Chak-duk'), *B. tulda* Roxb. ('Artungsa-u'), *Neohouzeana dallooa* (Gamble) A. Camus ('Tarang') and *Dendrocalamus hamiltonii* Nees et Arn. ex Munro ('Kaiphau'). Posts, rafters, pillars of platform, etc. are made from *Cassia fistula* L. ('Hanalu-araung,' 'Haun-aru-araung'), *Dysoxylum binectariferum* (Roxb.) Hk.f. ex Bedd. ('Khrang-kelauck-araung,' 'Naupak-ban'), *Gmelina arborea* Roxb. ('Phang-araung,' 'Phang-kur-bau,' 'Phang-laubaung'), and *Mesua ferrea* L. ('Micharne,' 'Nahaur-araung,' 'Pikcharne-araung'). The roof is thatched usually with leaves of *Livistona jenkinsiana* Griff. ('Takau-araung') and *Imperata cylindrica* (L.) P. Beauv. ('Phalang') and occasionally with *Calamus erectus* Roxb. ('Pre,' 'Tor'), *C. latifolius* Roxb., *Phrynium pubinerve* Bl. ('Kau-arbau').

All furniture is made from plant materials. The floor, or a raised platform made of bamboos, serves as a bed. A block of wood is used as a stool. Baskets of bamboo and cane are employed for storing paddy, clothes and other household goods. These baskets are of various shapes and sizes. Traditional kitchen utensils of wood and bamboo are slowly being replaced by metallic utensils.

Rivers and streams are the main pathways in the area. Bamboo rafts are the chief mode of water transport in some places. Women usually come down from hilltops to valleys for bathing and washing clothes in the rivers, and return to their homes with calabashes and bamboo pipes filled with drinking water (Fig. 4).

Fruits of *Sapindus mukorossi* Gaertn. ('Phan-phe,' 'Thaukri') are commonly employed as detergent, and bark of *Buettneria aspera* Colebr. ex Roxb. ('Barauk-

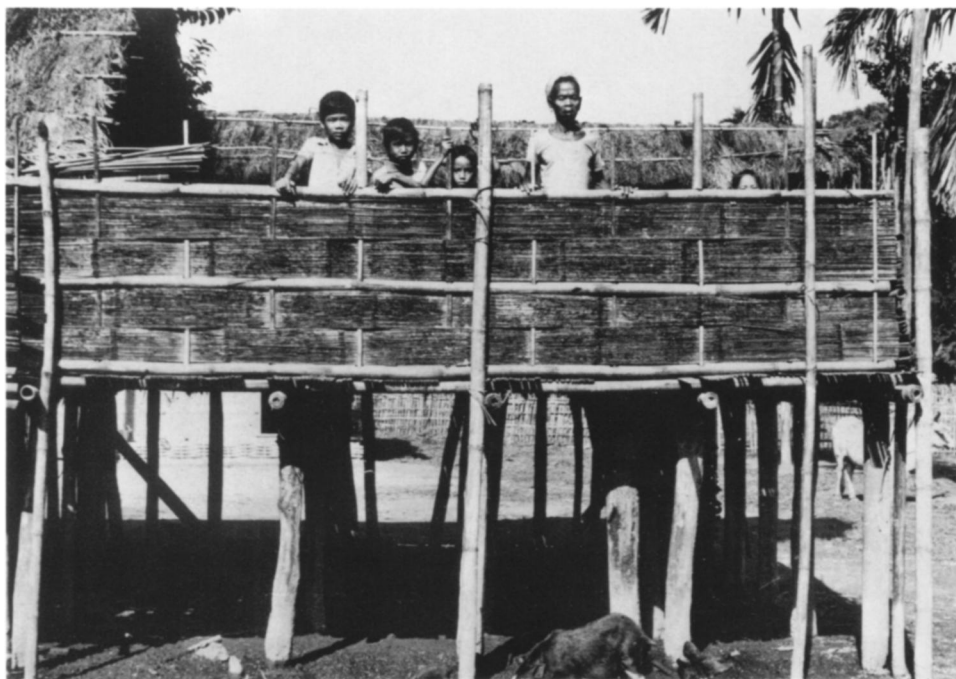


Fig. 3. A Mikir tribal hut on raised platform.



Fig. 4. Mikir women carrying water in bamboo pipes.



Fig. 5. A Mikir woman with a conspicuous tattoo mark on her face. The dyes used for tattooing are of plant origin.

pau,' 'Warpauk-pau') and leaves of *Phlogacanthus tubiflorus* Nees ('Banchauk,' 'Banchha,' 'Chakban') are used for washing hair.

Handloom weaving is an integral part of the Mikir culture. Articles are made almost entirely for personal consumption and not for sale. The looms in use are of loin type, with simple implements, made of wood and bamboo (Borthakur, 1976).

The Mikirs cultivate *Gossypium herbaceum* L. ('Phalau,' 'Kumphat') for cotton and *Ricinus communis* L. ('Inki-an') for rearing endi silkworm.

The Mikir women tattoo their faces by a vertical line from forehead to chin (Fig. 5). All dyes used by the Mikirs for tattooing or for colouring their garments are of vegetable origin. The most important is *Baphicacanthus cusia* Brem. ('Bukangda,' 'Bukangku,' 'Sibu') which is used for tattooing. Barks of *Aporosa dioica* Benth. ('Tamsir-araung'), *Baccaurea sapida* (Roxb.) Muell.-Arg. ('Dam-

pia-araung'), *Oroxylum indicum* (L.) Vent. ('Napak-ban-araung') and *Pithecolobium angulatum* Benth. ('Inghauk'), leaves of *Indigofera dosua* Buch.-Ham. ex Don ('Bujir') and unripe fruits of *Smilax ocreata* DC. ('Philang-tung-araung') are also used for tattooing and colouring garments.

The forests supply their requirement of fuel for cooking and heating during winter. *Melia azedarach* L. ('Han-thapi,' 'Nim-tita-araung'), *Schima wallichii* (DC.) Korthals ('Chekan-araung,' 'Chingan-araung'), *Litsea monopetala* (Roxb.) Persoon ('Supin-um-araung') and *Bischofia javanica* Bl. ('Phang-araung,' 'Phang-put-araung') are believed by the Mikirs to be high quality fuels.

MAGICO-RELIGIOUS BELIEFS ABOUT PLANTS

The Mikirs believe in many gods, but they have no idols, temples or shrines. They believe in pantheism (Parampanthi, 1977; Terang, 1965). There is no worship of plants or animals, but plants play a significant role in performance of their religious rituals.

Castanopsis indica (Roxb.) DC. ('Phang-rang-araung'), *Dracaena petiolata* Hk.f. ('Laungla'), *D. angustifolia* Roxb. ('Charlang'), *Dendrocalamus hamiltonii* Nees et Arn. ex Munro ('Kaiphau'), *Phlogacanthus tubiflorus* Nees ('Banchauk,' 'Banchha,' 'Chak-ban'), *Piper attenuatum* Buch.-Ham. ex Miq. ('Ai-tithi') and *Salmalia malabarica* (DC.) Schott. et Endl. ('Pakaung-araung') are a few examples of plants which are used in their various ceremonies of worship.

The beliefs about plants and most probably the basic idea of religion might have had a significant influence on the management of vegetable resources by the Mikirs. They have planned careful, non-wasteful uses of their resources, a factor which must have helped these aboriginal people to survive on the vegetal resources until today.

PLANTS FOR RECREATION

Plants and plant products involved in recreational activities are rarely recorded in literature; they are considered too obvious and hence taken for granted. For example, playing with bamboo rafts during monsoon, making garlands of flowers or simply playing in forests are recreational activities of all children. Construction of miniature huts by boys, collection of wild leaves and fruits and their cooking by girls for fun are their recreation and preparation for a future role in family life.

Many musical instruments such as drums and flutes are made from bamboos and wood of *Artocarpus heterophyllus* Lamk. ('Jang-phaung-araung'), *Gmelina arborea* Roxb., *Mangifera indica* L. ('Tharbi-araung'), and *Terminalia myriocarpa* Heurck et Muell.-Arg. ('Turtung-araung').

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Ethnobotany of Ladakh, India: Beverages, Narcotics, Foods

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Ethnobotany of Ladakh, India: Beverages, Narcotics, Foods¹

IRSHAD A. NAVCHOO AND G. M. BUTH²

Ladakh is India's link with the exotic past. Popularly known as little Tibet or Western Tibet, Ladakh is one of the richest centres of Buddhist art and culture. It has its own deep-rooted traditions, which have been protected and practised for centuries. The present communication puts on record some of the traditional ladakhi preparations that have been used for hundreds of years. Those described are (1) beverages—chhang and gur gur cha; (2) narcotics—berzeatsink, staspakchek, techepakchiatzen, zimpating, and lingeatzish; and (3) foods—khambir, kholaq, mok mok, and thukpa.

Ethnobotanie du Ladakh, India: Boissons, Aliments, Narcotiques. Le Ladakh sert de lien avec le passé exotique de L'Inde. Communément connu sous les noms du petit Tibet ou Tibet de L'est, le Ladakh est l'un des centres les plus riches de l'art et de la culture Bouddhiques. Il a des traditions bien enracinées, protégées, et pratiquées depuis des siècles. La communication présente note quelques-unes d'entre les préparations traditionnelles du Ladakh utilisées depuis des centaines d'années. Celles dont il est question ici sont (1) boissons: chhang et gur gur cha, (2) narcotiques: berzeatsink, staspakchek, techepakchiatzen, zimpating, et lingeatzish; et (3) aliments: khambir, kholak, mok mok, et thukpa.

Ladakh, with its vast sandy desert set among the jagged peaks of the north-western Himalaya, is also known as little Tibet or Western Tibet. The lowest valleys of the region, located between 3000 m and 3500 m, are situated between 30°15' to 36°0' N latitude and 75°15' to 80°15' E longitude. An exceptionally cold and dry area, Ladakh has an annual rainfall of less than 12 cm; temperatures sometimes drop to as low as -50°C. Its long winters are as severe as those of almost any inhabited region of the world.

Ladakhis of Tibetan stock are known as Bhotas or Bhotpas. Followers of Buddha, they comprise about 70% of total population of Ladakh. The other races include Baltis (migrants from Baltistan), Dards (migrants from Dardistan), and nomadic Changpas, who roam about the highland plateaux of Ladakh and Tibet. Despite the harsh climate, the ladakhi not only manage but are able to enjoy life of greater prosperity than that of many other Himalayan people whose natural resources are more abundant.

Until recently the traditional way of life had seen little change over the centuries. Since 1974, however, when Ladakh was thrown open to tourists, it has become more and more exposed to external influences. The tourist industry has gradually eroded the local culture and may endanger the very foundation on which ladakhi society is built.

Ladakhis are fond of local preparations, which have been an important part of their culture and tradition (Atal et al. 1984; Khan 1980). With affluence and progress, some of these do not find any place in modern households, which are

¹ Received 20 April 1988; accepted 27 September 1989.

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now discarding their old traditions in preference to what is now known as modernity. However, people, particularly in rural areas, still make use of these preparations. The present communication is a result of detailed study of people-plant relationships carried out in the region for the past 3 yr. It describes some indigenous preparations long used in Ladakh.

BEVERAGES

Chhang

Chhang, a local beer, is an important part of everyday life of an average ladakhi. In Leh town is a street named "chhang gali" where men and women sell chhang.

The important constituents of chhang are the chhang tablets, or phaph, and naked barley (*Hordeum vulgare* L., Poaceae; IAN1259, KASH), or grim. Chhang tablets are sold in the market and also prepared at home.

Preparation of phaph. Wheat flour, locally known as pay, is mixed with powdered twigs of burnak *Artemisia tournefortiana* Reichenb., Asteraceae; IAN 1224, KASH), roots of Chargosposz *Delphinium cachemirianum* Royle, Ranunculaceae; IAN 319, KASH), and fruits of zama (*Tribulus terrestris* L., Zygophyllaceae; IAN 137, KASH). The whole mass is kneaded into a paste and rolled into small globose tablets. Meanwhile a thin layer of fresh twigs of burnak is laid on a woollen cloth in a dark but warm room. The tablets are placed on it and covered with another layer of burnak. The whole is covered by a woollen cloth and left undisturbed for 10–15 d, depending on room temperature. After the desired period is over, the woollen cloth and the layer of burnak beneath is removed. The tablets, lower layer of burnak, and woollen sheets are left undisturbed until the tablets—phaph—are dry.

The phaph tablets are powdered and mixed thoroughly with boiled grim. The whole mixture is transferred into a bag that is kept tightly closed for 5–10 d until the grains begin to smell. The grains are then transferred into an earthen pitcher to half its capacity. The lid of the pitcher is kept tightly closed and left as such at a warm place for 7–8 d. After a week or so water is added to the pitcher and lid closed again. The drink is ready in 3–10 d. The concentration of alcohol in the drink after 3–5 d is classified as "moderate"; after 5–7 d, as "good"; and after 7–10 d as "super." It is desirable to filter the chhang before consumption.

Gur gur cha

This is a local salt tea specially prepared in an indigenous instrument known as a "gur gur."

The gur gur is a long cylindrical vessel, nearly 1 m long and about 15 cm in diameter. Brought from Tibet in ancient times, it was made from strips of bamboo stem placed together skilfully and artistically. At present the gur gur is made from yerpa wood (*Populus nigra* L., Salicaceae; IAN 533, KASH) by boring a hole into a long cylindrical piece of stem cut suitably. The finished vessel is tastefully decorated on the outside by copper and other skilfully designed metallic bands. The other part of the gur gur is a churning rod with a flat head also made from yerpa.

To prepare gur gur cha, Tea leaves (charil) bought from Nepal are usually used.

The leaves are boiled in water for 1–2 h and the decoction put into the gur gur. It is diluted a little by adding hot water. Salt and butter are added in the gur gur and the mixture is thoroughly churned by the churning rod so that butter gets emulsified. The tea is transferred to a beautifully ornamented copper kettle placed on a fire pot also made of copper. Generally a large quantity is prepared in the morning and stored in the kettle and served throughout the day. At one time, beautifully ornamented silver cups were used for serving the tea. Due to profound change in socio-economy of the region, even the use of copper ware is becoming rare; replacements are thermos flasks, chinaware, and steelware.

NARCOTICS

Berzeatsink

Roots of depgul (*Lancea tibetica* Hk.f. & T., Scrophulariaceae; *IAN* 538, KASH) are dried and roasted over a fire. The roasted roots are mixed with tobacco and powdered. Either smoked with tobacco or taken with milk, the preparation is claimed to stimulate and activate a person.

Staspakchek

Dried leaves of staspak (*Limmonium macrorhabdos* O. Ktze, Plumbaginaceae; *IAN* 613, KASH) are crushed and fried. The fried mass is sun-dried for 7–8 d and then powdered. The powder is dissolved in water and transferred to a bottle, which is tightly corked and left as such for a week. The drink is reported to be dangerous if taken in large doses.

Techepakchiatzen

Dried seeds of techepak *Peganum harmala* L., Zygophyllaceae; *IAN* 41, KASH) are roasted on a red-hot iron plate. These are pulverized and passed through a thin sieve to obtain a fine powder, which is taken as such or smoked with tobacco.

Zimpating

Young twigs and mature fruits of zama (*Tribulus terrestris* L., Zygophyllaceae) are dried and powdered. The powder is roasted and dissolved in milk. The mixture is kept for 3–4 d and then taken after meals. It is reported to cause delirious conditions if taken in excess.

Lingeatzish

Dried, powdered leaves of lingna (*Utricularia minor* L., Lentibulariaceae; *IAN* 1543, KASH) are roasted on a flat stone kept on a fire. They are then stirred into water and kept in a tightly closed bottle underground for 10–15 d. The drink is usually taken in winter. It is highly intoxicating; deaths have been reported.

FOODS

Khambir

Wheat flour, locally known as pay, is kneaded, using 250–300 g of curds and a little water. The kneaded mass is kept for 10–12 h until it begins to smell. Dry

leftovers of bread are covered on all sides with this kneaded mass. Individual pieces of bread are then wrapped in a wet cloth and placed on a flat surfaced stone, which in turn is kept on a fire until the cloth begins to dry. At this stage, the cloth is removed and the bread is put into a fire of moderate intensity until the desired baking is complete. Khambir is usually served with gur gur cha or chhang or may be taken with any vegetable preparation. It is a ready-to-eat food for long journeys and trekking.

Kholaq

This is a food used during journeys. Two types of kholaq are prepared, one with gur gur cha, the other with chhang. It may be sweet or salty, nampay kholaq and yoche kholaq, respectively.

A cup of fried wheat flour known as sathu and half a cup of butter are mixed in a big bowl. To this is added a cup of gur gur cha or a glass of chhang. Powdered sugar or salt is added to taste. The mixture is thoroughly kneaded and rolled into various shapes and dried. Kholaq can be taken with water, tea, chhang, or any vegetable preparation.

Mok mok

This is a soft, white, non-vegetarian snack.

One kilogram of goat meat or minced meat is mixed with 250 g of fat and 100 g of onions. Salt, chillies, black pepper, and fennel are added to it. The mixture is spread on unbaked bread (chappatis), rolled into triangular masses, and put in a pot whose porous base is pasted with butter on the inner side. The pot is then placed in a special mok mok steamer and subjected to steam under pressure for 1 h. The steamer is then cooled and mok mok served hot. It is served at breakfast and as a delicacy at special functions.

Thukpa

This is one of the most popular food preparations of Ladakhis. It is a mixture of almost all the nourishing foodstuffs. Several vegetables (e.g., onion, carrot, radish, turnip, potato), a little garlic, chicken or mutton soup, some starchy material, and some spices (e.g., cardamom, cinnamon, pepper, fennel, coriander, ginger, etc.) are mixed together in an appropriate proportion. The whole mass is steamed in a closed vessel. It is served hot as such or with either steamed buckwheat noodles or rice.

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Medicinal Plant-lore of Tamang Tribe of Kabhrepalanchok District, Nepal¹

N. P. MANANDHAR²

Tamangs, one of the ethnic tribes of Nepal, have a good association with plant resources they use for their existence. The paper provides a glimpse of medicobotany of this tribe. As many as 95 plant species, both wild and cultivated, representing 88 genera under 47 families, have been found to be of common use for the treatment of various ailments. Curculigo orchioidea is the only plant representing the monocotyledons.

Pflanzenmedizinische Tradition des Tamang-Stammes im Kabhrepalanchok-Gebiet Nepals. Die Tamangs, eine der ethnischen Stämme Nepals, haben eine enge Beziehung zur Pflanzenwelt, die sie als Lebensgrundlage nutzen. Dieser Artikel gibt einen Einblick in die Heilpflanzenkunde dieses Stammes. Man hat nicht weniger als 95 verschiedene, sowohl wildwachsende als auch gezüchtete entdeckt, Pflanzenspezies die Anwendung in der Behandlung unterschiedlichster Erkrankungen finden. Diese Pflanzen repräsentieren 88 Gattungen in 47 Familien. Curculigo orchioidea ist die einzige unter ihnen, die monokotyle aufgebaut ist.

The district of Kabhrepalanchok (27°20'–27°85'N, 85°24'–85°59'E), one of the 75 districts of Nepal, is inhabited by different ethnic tribes, thus offering unusual opportunities for ethnobotanical studies. Tamangs, one of these tribes, depend on the surrounding plants for their health care. The area of this district is 1446 km²; elevation ranges from 1007 to 3018 m. The population is 299,000. The district has monsoonic climate with maximum temperature of 36°C in June; the minimum falls down to 0°C in winter. The total annual rainfall is ca. 1150 ml. The months from November to January are very cold; the area experiences hardly any rainfall during this period (Anonymous 1975). The vegetation is mostly of tropical and subtropical forest concentrated on the main ridges of the hills and its spurs. The valleys invariably have cultivated fields.

PEOPLE

Tamangs are stout and strong with brown or light complexion and slanted eyes. They prefer to settle in groups. Their two-story houses are built with stones, wood, and mud, and roofs are thatched with grass. The ground floor is utilized for sleeping and kitchen purposes; the upper one, as the storage area. The people follow Buddhism and build village *Gompa*, the sacred monastery where religious activities are performed. *Lha* is their lineage god. *Hwai*, *Phawar*, *Tamba kaitan*, and *Deuta* are their favourite folk songs; the popular dances are *Damphu*, *Dora*, and *Saraswati*. Marriage is arranged by the parents, or the man and the woman marry according to their will. Generally, cremation of the dead takes place on the hills rather than in the valleys.

¹ Received 6 April 1989; accepted 14 April 1990.

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Fig. 1-2. Medicinal plant use in Kabhrepalanchok District, Nepal. **Fig. 1.** Collecting drug plants. **Fig. 2.** A female healer pounding medicinal herb on a stone mortar.

METHOD OF STUDY

The data given here are based on first-hand notes gathered during two field trips in 1984 and 1988. Each trip lasted 15 d. Forty-five *Jhankries* (the local healers), consulted for traditional uses of herbal plants, were asked about the plants they collect and use (Fig. 1), their local names, plant parts used, preparation of remedies, diseases treated, and dose and regimen of the drug. The healers

usually keep their knowledge of plants secret and are unwilling to reveal it to outsiders. Intimate contacts were developed with these *Jhankries* after staying with them for many days. Only then were they convinced that their cooperation was of great benefit to the development of the village and of the country as well. Besides, they were also assured that this study would not in any way interfere with the continued practice of their art. Repeated queries were made from time to time with the same informants and cross-checked at different places with other informants. The data were considered valid if at least five informants had similar comments about the medicinal properties of the plant.

Among the different forms of medication, juice is obtained by squeezing or crushing the parts of the plants with a piece of stone or wood, and straining through a piece of cloth by twisting it tightly. A paste is prepared by pounding the medicinal parts of plants with a stone pestle on mortar (Fig. 2).

With the rapid spread of modern technology in this area, widespread acculturation of ethnic communities is taking place. It is for the purpose of recording the uses of plants in folklore and folklife that this study—the first in its region—was carried out among the Tamangs.

THE MEDICINAL PLANTS

The plants are given under their respective families, which are arranged alphabetically. Under each family, the species are arranged alphabetically. Data in each species account are presented in the following order: scientific name, Tamang name (in parentheses), collection number (in italics), and ethnobotanical notes. All plants were collected by the author; voucher specimens are preserved in Botanical Survey and Herbarium (KATH), Godawari, Lalitpur, Nepal.

Acanthaceae

Justicia adhatoda L. / (basak) / 12192 / Leaf juice (about two teaspoonsful three times a day) is prescribed in malarial fever. The leaves, roots, and flowers are used to treat cough, bronchitis, and asthma (Anonymous 1948–1976; Chopra et al. 1985; Watt 1889–1893). A new quinozoline alkaloid was isolated from this plant (Chowdhury and Bhattacharyay 1985).

J. procumbens L. / (ghyuru puju) / 12175 / Root juice (about two teaspoonsful three times a day) is given to treat typhoid. This herb is ingested in cases of asthma, cough, rheumatism, backache, and flatulence; leaf-juice is squeezed into the eye in cases of ophthalmia (Anonymous 1948–1976).

Thunbergia coccinea Wall. ex D. Don / (gau lahara, kaulunthunga) / 12681 / Plant juice is applied locally to treat fresh wounds; root is chewed to treat boils on the tongue.

Amaranthaceae

Achyranthes aspera L. / (hyurpuju) / 12240 / Root paste (about 5 g three times a day) is given to alleviate postnatal pain and to accelerate expulsion of the placenta. The plant possesses diuretic, laxative, astringent, and purgative properties (Anonymous 1948–1976; Chopra et al. 1958; Watt 1889–1893).

Amaranthus spinosus L. / (bangaidhap) / 12576 / Root paste is applied on boils to remove pus; root juice (about two teaspoonsful three times a day) is recommended in cases of fever. The root is used to treat gonorrhoea (Watt 1889–1893).

Amaryllidaceae

Curculigo orchiioides Gaertn. / (banjari) / 12100 / Root juice (about one teaspoonful twice a day) is given in cases of peptic ulcer. The root is prescribed to treat asthma, piles, jaundice, diarrhoea, and gonorrhoea (Chopra et al. 1958; Watt 1889–1893).

Anacardiaceae

Rhus parviflora Roxb. / (satibro) / 10340 / Seeds are eaten raw to treat stomachache. Fruit juice is credited with vermifuge properties (Anonymous 1948–1976).

Annonaceae

Annona squamata L. / (aant) / 12249 / Root or seed paste is applied on the forehead for headache. The unripe fruit, seed, leaf, and root are used for destroying insects and lice (Watt 1889–1893); the bark is astringent; the leaves are prescribed to counter malignant tumours (Drury 1873).

Apiaceae

Centella asiatica (L.) Urb. / (tajhwai) / 12057 / Plant juice (about three teaspoonsful three times a day) is given to treat typhoid. In parts of India, leaf juice is used to improve memory and as an alterative and a tonic (Anonymous 1948–1976; Chopra et al. 1958).

Heracleum nepalense D. Don / (nhajyugmran) / 12724 / Root paste (about 3 g twice a day) is given to treat diarrhoea.

Sanicula elata Buch.-Ham. ex D. Don / (meman) / 12750 / Root juice (about three teaspoonsful twice a day) is given to treat indigestion.

Apocynaceae

Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don / (gnedor) / 10367 / Bark is boiled with milk and is drunk to treat dysentery with bloody stools. The bark is reputed as a remedy for dysentery and bowel complaints (Anonymous 1948–1976; Drury 1873); the root is used as febrifuge, antidysenteric, and anthelmintic (Chopra et al. 1958; Watt 1889–1893).

Asteraceae

Anaphalis contorta (D. Don) Hook.f. / (taptap) / 12108 / Root paste is applied to treat wounds and boils.

Artemisia indica Willd. / (chyan jyan) / 12028 / To treat the ailment, a child with diarrhoea or dysentery is seated over the heated plant.

Cirsium verutum (D. Don) Spreng. / (chokam) / 12236 / Root juice (about two teaspoonsful twice a day) is given to treat fever.

Conyza stricta Willd. / (thangsing) / 12255 / Root juice (about two teaspoonsful three times a day) is recommended in cases of diarrhoea and dysentery.

Cyathocline purpurea (Buch.-Ham. ex D. Don) O. Kuntze / (nashamran) / 12171 / Vapor from the mashed plant is inhaled to treat headache.

Emilia sonchifolia (L.) DC. / (dudhe) / 12246 / Flower head is chewed and kept for a while inside the mouth to protect teeth from decaying.

Eupatorium adenophorum Spreng. / (banmara) / 12024 / Root juice (about one teaspoonful three times a day) is prescribed to treat fever. Pure juice of the leaf is poured in the eye to treat insomnia; the decoction of the plant is used as febrifuge (Drury 1873). Pyrrolizidine alkaloids were isolated from the aerial parts of the plant (Cheng and Roeder 1986).

Inula cappa (Buch.-Ham. ex D. Don) DC. / (ranabhyang) / 12207 / Root juice (about two teaspoonsful three times a day) is given for fever.

Siegesbeckia orientalis L. / (chhyukutinai) / 12812 / Plant juice is applied as a remedy for wounds, is used to treat ringworm and other parasitic infections, and to treat gregarious ulcers and sores in rheumatism and renal colic (Anonymous 1948–1976).

Spilanthes clava DC. / (saprumu, syaprumu) / 12030 / Flower head is chewed to protect teeth from decaying. Flower heads are considered stimulants and are used for headache, affections of the throat and gums, and toothache (Watt 1889–1893).

Vernonia cinerea (L.) Less. / (pramalamran) / 12034 / Plant, mixed with young leaves of *Lyonia ovalifolia*, is pounded and applied as a remedy for wounds.

Berberidaceae

Berberis aristata DC. / (tigiri chyungwa) / 12103 / Bark is boiled in water and then strained; the resulting liquid is used to treat eye inflammation. The fruit has cooling and laxative properties; the root bark is valued for intermittent and remittent fevers (Watt 1889–1893).

Mahonia napaulensis DC. / (chachan) / 12747 / Bark juice is poured on the eye in cases of inflammation.

Boraginaceae

Cynoglossum glochidiatum Wall. ex Benth. / (boko tinai) / 12040 / Plant juice is applied to treat wounds.

Buxaceae

Sarcococca coriaceae (Hook.) Sweet / (patape) / 10356 / Root juice (about two teaspoonsful twice a day) is given to treat fever.

Campanulaceae

Lobelia pyramidalis Wall. / (eklebir) / 12019 / Plant is boiled with water and strained; the liquid (about four teaspoonsful three times a day) is given to treat fever.

Cannabaceae

Cannabis sativa L. / (ganja) / 12033 / Leaf juice is given to cattle suffering from diarrhoea. The female flowering top of the plant is a stimulant, a sedative, and an antispasmodic (Drury 1873). Various forms of the drug—namely, bhang, ganja, and charas—are said to be narcotic and diuretic and are used in hydrophobia, urine haemorrhage, rheumatism, hay fever, asthma, and skin diseases (Watt 1889–1893). Cannabinoid ratios were compared in developing seedlings and adult plants. In seedling plants, maximum cannabinoid levels were obtained in primary leaves while dominant cannabinoid of older plants was obtained from secondary leaves (Vogelmann et al. 1988).

Caryophyllaceae

Drymaria diandra Bl. / (abijal) / 12046 / Plant, mixed with *Valeriana jatamansi*, is pounded and applied on the belly of a child ailing from diarrhoea and dysentery.

Chenopodiaceae

Chenopodium ambrosioides L. / (betu) / 12193 / Seed paste (about 3 g twice a day) is given to treat peptic ulcer. The essential oil of the plant is said to possess tonic and antispasmodic properties (Watt 1889–1893).

Combretaceae

Terminalia alata Heyne ex Roth / (sas) / 12647 / Bark juice is applied to treat wounds.

Cucurbitaceae

Mukia maderaspatana (L.) Roem. / (nagilangiai) / 12575 / Seed paste is applied to treat scabies of animals. The root decoction is useful in flatulence and is given to reduce toothache. (Watt 1889–1893).

Ericaceae

Lyonia ovalifolia (Wall.) Drude / (domsing) / 12107 / Paste from tender leaves is applied to treat boils and pimples.

Euphorbiaceae

Antidesma acidum Retz. / (nakadansing) / 10345 / Bark paste is applied to treat mumps.

Bridelia retusa (L.) Spreng. / (gramachhe) / 12165 / Young leaves are poisonous to cattle. The bark possesses anthelmintic properties (Watt 1889–1893).

Euphorbia heterophylla L. / (nator chhe) / 12069 / Milky juice is applied to treat wounds.

E. hirta L. / (trishubha mran) / 12203 / Plant juice is used to remove pus inside the ear. Plant decoction is used in bronchial affections and asthma (Chopra et al. 1958). In the form of tincture, the plant is considered useful in cases of colic, dysentery, parasitic infestation, and genito-urinary tract diseases (Anonymous 1948–1976). Tannins and polyphenols were isolated from this plant (Yoshida et al. 1988).

Jatropha curcas L. / (gada, gyagar desya) / 12235 / Milky latex is applied to alleviate sprains. Juice from the stem is applied to wounds, foul ulcers, and in cases of rheumatism (Drury 1873; Watt 1889–1893); seed-oil has purgative properties (Anonymous 1948–1976; Chopra et al. 1958).

Ricinus communis L. / (dhandarobi) / 12198 / Flower or fruit juice is applied to treat obstinate wounds. Seed oil is purgative and is also used in treating acute diarrhoea caused by any form of food poisoning (Anonymous 1948–1976; Watt 1889–1893); warmed leaves are applied to the abdomen to facilitate menstrual discharge (Drury 1873).

Fabaceae

Bauhinia malabarica Roxb. / (aambu) / 12631 / Flower paste (about 5 g twice a day) is given for stomachache.

B. variegata L. / (aambu) / 12206 / Bark juice (about three teaspoonsful three times a day) is prescribed in cases of diarrhoea and dysentery. The bark is considered an astringent, an alterative, and a tonic (Anonymous 1948–1976; Drury 1873); the root decoction is given in dyspepsia and flatulence (Watt 1889–1893). Phytochemical examination of the stem resulted in the isolation of β -sitosterol and lupeol (Gupta et al. 1980).

Desmodium microphyllum (Thunb.) DC. / (saritamba ghugi) / 12035 / Plant paste is applied to remove pus from wounds.

Flemingia strobilifera (L.) Ait. / (gahate) / 12174 / Root juice (about three teaspoonsful twice a day) is recommended in cases of diarrhoea and dysentery. The roots are given in epilepsy (Watt 1889–1893).

Mimosa rubicaulis Lam. / (hunrapa puju) / 12261 / Ground seeds (about 2 g three times a day) are taken to alleviate fever. Ingestion of leaves is prescribed in cases of piles (Chopra et al. 1958).

Fagaceae

Castanopsis indica (Roxb.) Miq. / (berkap, kyakar polo) / 12041 / Plant resin (about 4 g twice a day) is given to treat diarrhoea.

Hypericaceae

Hypericum cordifolium Choisy / (marmhendo) / 12172 / Tender leaves are poisonous to cattle.

H. japonicum Thunb. ex Murray / (nacha mhendo) / 12189 / Root juice (about two teaspoonsful three times a day) is prescribed as a remedy for fever.

H. oblongifolium Choisy / (kalan) / 10362 / Leaf juice is said to be an antidote against snakebite.

Lamiaceae

Colebrookea oppositifolia Sm. / (busul sul) / 12241 / Root is boiled with water and strained; the liquid is applied to treat sprains and body pain.

Elsholtzia blanda (Benth.) Benth. / (lhasilam) / 12029 / Leaf juice is applied to treat wounds.

Leucas mollissima Wall. ex Benth. / (chilimran) / 12260 / Flower paste (about 3 g twice a day) is given to alleviate fever.

Micromeria biflora (Buch.-Ham. ex D. Don) Benth. / (masinomran) / 12080 / Plant paste is applied to treat wounds. In India, the plant is applied to worm-infested wounds in cattle (Anonymous 1948–1976).

Pogostemon amaranthoides Benth. / (rasangan) / 12676 / Root is chewed and leaf juice is applied on the forehead, the chest, and the back to treat cough.

Scutellaria scandens Buch.-Ham. ex D. Don / (nalsal) / 12257 / Root juice is applied on the back to treat backaches; it is also given to domestic animals to prevent miscarriage.

Loranthaceae

Loranthus odoratus Wall. / (donglanai) / 12109 / Fruits are eaten to treat indigestion.

Lythraceae

Woodfordia fruticosa (L.) Kurz / (bipkanda, birukanda) / 12140 / Flower juice (about two teaspoonsful twice a day) is given to treat dysentery with bloody stools.

Malvaceae

Sida rhombifolia L. / (syodal) / 12256 / Plant juice (about two teaspoonsful twice a day) is given to treat headache. The plant and roots are considered useful in tuberculosis, and rheumatism (Anonymous 1948–1976).

Melastomataceae

Osbeckia nepalensis Hook. / (ambal bumbal, lemlang) / 12039 / Leaf juice is applied on cuts and wounds.

Meliaceae

Cipadessa baccifera (Roth) Miq. / (paimati, painleti) / 10342 / Bark juice (about two teaspoonsful twice a day) is given to treat indigestion; root juice is prescribed as anthelmintic.

Melia azedarach L. / (bakaina, chanyal) / 12117 / Bark paste (about 2 g once a day) is recommended as anthelmintic. Juice from the leaves is said to be anthelmintic and diuretic and is also an emmenagogue (Chopra et al. 1958; Watt 1889–1893); poultice of flower is used to eradicate lice and to treat skin diseases (Anonymous 1948–1976).

Trichilia connaroides (Wight and Arn.) Bentvelzen / (tailung) / 10370 / Oil from the seed is applied to treat scabies.

Menispermaceae

Cissampelos pareira L. / (kwartang gugi) / 12162 / Plant juice (about six teaspoonsful twice a day) is recommended after delivery to stop bleeding and to counteract the loss of blood. The leaves are applied externally for sores and itches (Anonymous 1948–1976; Watt 1889–1893). The root is diuretic and is used as an antiseptic in the bladder and in chronic inflammation of the urinary passage (Chopra et al. 1958; Drury 1873).

Moraceae

Ficus auriculata Lour. / (maku) / 12129 / Roasted figs are prescribed in cases of diarrhoea and dysentery.

Myricaceae

Myrica esculenta Buch.-Ham. ex D. Don / (karbija, karpesi) / 12101 / Bark juice (about two teaspoonsful three times a day) is given to treat dysentery with bloody stools. Bark decoction is considered valuable in treating asthma, diarrhoea, catarrhal fever, cough, and affections of the throat (Chopra et al. 1958; Watt 1889–1893).

Myrtaceae

Psidium guajava L. / (aamba) / 12161 / Bark juice (about three teaspoonsful twice a day) is given as a remedy for stomachache. The leaves are used for wounds, ulcers, and as an astringent for the bowels (Anonymous 1948–1976). The fruit and the root bark are astringent and are applied to treat diarrhoea (Chopra et al. 1958; Watt 1889–1893).

Nyctaginaceae

Mirabilis jalapa L. / (lanujana) / 12245 / Root juice (about three teaspoonsful twice a day) is given to treat indigestion; the paste of the root is applied to treat muscular swelling caused by bruises. Bruised leaves form a favourite application on abscesses and boils (Watt 1889–1893).

Oxalidaceae

Oxalis corniculata L. / (nakhru pangyun) / 12031 / Plant paste, mixed with butter, is applied to treat muscular swelling caused by some bruises. Leaves are considered refrigerant and antiscorbutic, and are also used as stomachics (Drury 1873; Watt 1889–1893).

Ranunculaceae

Anemone vitifolia Buch.-Ham. ex DC. / (phok sarpa, rikabe) / 12679 / Root juice (about two teaspoonsful three times a day) is given in cases of dysentery with bloody stools

Clematis graveolens Lindl. / (nashar) / 12651 / Seeds are mashed and applied on the forehead to alleviate headaches.

Thalictrum foliolosum DC. / (bathuri) / 12665 / Root juice (about two teaspoonsful three times a day) is recommended to treat peptic ulcer. In the form of decoction, extract, or powder, the root is used to treat intermittent fever and ophthalmia; also used as an antiperiodic, a diuretic, an aperient, and a purgative (Anonymous 1948–1976; Chopra et al. 1958; Drury 1873). Different alkaloids were extracted from the roots (Chattopadhyay et al. 1981).

Rosaceae

Agrimonia pilosa Ledeb. / (bokromran, tinai, urman) / 12673 / Root paste (about 3 g twice a day) is given in cases of stomachache; ash from burnt plant is applied on wounds.

Rubus ellipticus Sm. / (polang) / 12096 / Root descending from branches is made into a paste and prescribed (about 3 g twice a day) in cases of indigestion.

R. paniculatus Sm. / (me pulan) / 12179 / Leaf paste is applied to treat sprains.

Rubiaceae

Borreria alata (Aubl.) DC. / (ursing) / 12698 / Root juice (about two teaspoonsful three times a day) is given to treat malarial fever.

Hedyotis scandens Roxb. / (ganusa ablamban, phirphire) / 12960 / Root juice (about two teaspoonsful three times a day) is given to treat peptic ulcer.

Luculia gratissima (Wall.) Sweet / (bhra mhendo) / 12225 / Fruit juice (about two teaspoonsful three times a day) is given in cases of indigestion.

Spermadictyon suaveolens Roxb. / (khidand) / 12661 / Bark paste is given to treat cough in animals.

Rutaceae

Boenninghausenia albiflora (Hook.) Reichneb. ex Meissn. / (merere, nagpadong) / 12227 / Leaf juice is applied on fresh wounds.

Zanthoxylum armatum DC. / (prumu) / 12123 / About two to four seeds are taken to remedy indigestion.

Santalaceae

Osyris wightiana Wall. ex Wight / (bhote sajini, bor sajini, nundhiki) / 12074 / Bark, boiled in water to a syrupy liquid and strained, is applied to treat dislocated bones. Leaves have emetic properties (Watt 1889–1893).

Sapotaceae

Aesandra butyracea (Roxb.) Baehni / (signmar) / 12224 / Oil from the seed is applied to treat boils and pimples. Butter from the seeds is used in rheumatism (Watt 1889–1893).

Saurauiceae

Saurauia napaulensis DC. / (amjur) / 12687 / Bark juice (about two teaspoonsful twice a day) is given to treat fever.

Saxifragaceae

Astilbe rivularis Buch.-Ham. ex D. Don / (ghanchhyangmran) / 12761 / Root juice (about two teaspoonsful three times a day) is given to treat diarrhoea and dysentery.

Solanaceae

Solanum aculeatissimum Jacq. / (kantakari) / 12106 / Powder of dried fruit is smoked to treat headache. Pounded root is applied to the gums to relieve toothache; fruit decoction is used as an enema (Anonymous 1948–1976).

S. anguivi Lam. / (gramji) / 12254 / Ripe fruit is squeezed and applied on the forehead as a remedy for headache. Smoke of burning fruit is used to alleviate toothache (Watt 1889–1893).

Theaceae

Schima wallichii (DC.) Korth. / (kyasing) / 12098 / Bark squeezed of all juices is given to animals infested with liver flukes; fruit pulp is an antidote against scorpion bites.

Urticaceae

Boehmeria platyphylla D. Don / (syambolo) / 12656 / Bark juice is applied to treat fresh wounds.

Maoutia puya (Hook.) Wedd. / (puwa) / 12648 / Bark juice (about two teaspoonsful twice a day) is given to treat indigestion.

Pilea anisophylla Wedd. / (chhal) / 12173 / Root juice is used to ward off dandruff.

Urtica dioica L. / (polo) / 12076 / Plant, mixed with marble stone or talc and bark of *Pinus roxburghii*, is made into a paste and applied in cases of bone

dislocation. The plant is used in sciatica, palsy, and rheumatism (Anonymous 1948–1976). Glycosides have been isolated from the roots of this plant (Chaurasia and Wichtl 1987).

Verbenaceae

Clerodendrum philippinum Schauer / (tajalhapte, thangapava) / 12054 / Leaf juice is applied to alleviate pimples and wounds; bark juice is applied on burns.

Premna barbata Wall. ex Schauer / (ginar) / 10346 / Wood is rubbed on a stone with some water; the paste thus prepared is applied on wounds.

Vitex negundo L. / (sinyal) / 12204 / Plant juice is applied to remove lice and other ectoparasites of chickens. The leaves, considered vermifuge and tonic, and smoked to get relief from headache and catarrh; leaf juice is applied to rheumatic swellings of joints (Anonymous 1948–1976). Dried fruit is vermifuge; a decoction of the root is used in intermittent and typhus fever (Drury 1873). A new glucoside was extracted from the leaves of this plant (Sehgal et al. 1982).

Vitaceae

Tetrastigma serrulatum (Roxb.) Planch. / (ghugi) / 12223 / Plant paste is applied to aid setting of dislocated bones.

RESULTS AND DISCUSSION

Analysis of the data shows 23 types of diseases and 95 plant species belonging to 88 genera under 47 families. Seventeen species were used to treat cuts and wounds, 15 for diarrhoea and dysentery, 12 for fever, 8 for indigestion, 7 for veterinary medicine, 6 for headaches, 4 each for peptic ulcer and stomachache, and 2 each for eye troubles, child delivery, scabies, anthelmintic, typhoid, boils, and toothache. For other complaints one species was used in each case. The Asteraceae contributed 11 species; Euphorbiaceae, 6; Lamiaceae, 6; Fabaceae, 5; Rubiaceae, 4; Urticaceae, 4; Ranunculaceae, 3; Acanthaceae, 3; Verbenaceae, 3; Berberidaceae, 2; Rutaceae, 2; Solanaceae, 2; Amaranthaceae, 2; and one each from the rest of the families.

Although the tribal people attribute most of the diseases and other misfortunes to spirits and often seek magical and religious practices or make animal sacrifices to get rid of diseases and illnesses, they do not part from the curative properties of plants. The *Jhankries* play an important role in tribal medicine. They are faith healers on one hand and herbalists on the other.

Until recently, the Tamang area remained almost unexplored ethnobotanically although scattered papers have appeared on other tribal ethnobotany of Nepal (Manandhar 1982, 1985, 1986a, 1986b, 1987b; Sacherer 1979; Shrestha 1985). The information promulgated by this tribe has been compared with some important reference works and other general works on economic botany (Banerjee 1955; Bhatta 1970; Coburn 1984; Dobremez 1976; Manandhar 1980a, 1980b, 1987a; Shrestha et al. 1986).

The plants mentioned here are still very popular in this area and enjoy a good reputation in folk medicine. In spite of an extensive, modern programme to uplift

the rural health, the traditional healers are still the only medical practitioners available to the Tamang tribe living in remote parts of this district.

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An interesting side issue of the matter is the fact that it affects the recorded parentage of the hybrid *Musa* described in the *Gardeners' Chronicle* (1895) as *Musa kewensis* \times . This hybrid is stated to be a cross between *M. Mannii* and *M. rosacea*. Inspection of the drawing there referred to leaves no doubt that "*M. rosacea*" is, in that case, again used incorrectly for *M. ornata*. *Musa kewensis* is itself, in the coloured drawing, extraordinarily like *M. ornata*, and the only clear evidence of the influence of *M. Mannii* is a splash of red pigment on the peduncle, which in *M. ornata*, so far as my observations go, is always green.

XLV.—SOME PERSIAN DRUGS. DAVID HOOPER.

The drugs described in the present article were nearly all collected in the bazaars of Teheran, Hamadan and Kirmandshah by Dr. J. M. Cowan and Dr. C. D. Darlington in the spring of 1929. An account of the tour is given in *Kew Bulletin* 1930, pp. 49-68, by Dr. Cowan in a paper "A Botanical Expedition to Persia." The drugs were all of a vegetable origin and have been identified at Kew with the assistance of the staff of the Herbarium and Museums. A few specimens included in the list are from collections made during the past five years by Mr. B. Gilliat-Smith, British Consul at Tabriz.

It is of great interest to have an opportunity of studying the origin of these drugs, and comparing them with the names of those found in ancient literature of Persia where materia medica has long been a special science. The most important of the Persian works on pharmacology is the *Kitabulabnyat an haqa 'iq-uladviyat*, or "Book of the Foundations of the True Properties of the Remedies," written about A.D. 970 by the physician Abu Mansur, who during one of his journeys visited India. B. Laufer (*Sino-Iranica*, 1919) says "This is not only the earliest Persian work on the subject but the oldest production in prose of the Neo-Persian literature. The text has been examined by R. Seligmann from a unique manuscript of Vienna dated 1055, the oldest extant Persian manuscript." There is a translation by Abdul-Chaliq Achundow from Baku. This has been rendered into German and published by Dr. R. Kobert in his "Historische: Die pharmacologischen Grundsätze des Abu Mansur Muwaffak, 1893." References to this work are noted under the name "Achundow."

In the year 1681 there was published in Paris the "*Pharmacopoeia Persica, ex idiomate Persico in Latinum conversa, opus missionariis, mercatoribus, caeterisque Regionum Orientalium, Lustratoribus necessarium nec non Europaeis Nationibus perutile.*" This was written by a Carmelite monk, Frater Angelus. There is a short list of a few raw drugs, but the work contains chiefly prescriptions for pharmaceutical preparations, many of which are made up of 15 to 20 ingredients.

A valuable work of more recent date is one published in Teheran in 1874. It was compiled by Prof. J. L. Schlimmer, of the Polytechnic

College of Persia, Chief Medical Officer to the Persian Army, and Sanitary Officer, Teheran. It is written in French, and entitled "Terminologie Médico-Pharmaceutique et Anthropologique Française-Persane." This contains a very full list of medicinal plants of Persia with identifications made by Boissier, the De Candolles, Haussknecht and other eminent European botanists and pharmacologists.

Dr. J. E. T. Aitchison has botanically explored portions of Persia and the neighbouring regions, and his "Notes on the Products of Western Afghanistan and of North-Eastern Persia," published in Edinburgh in 1890, has been most useful for reference. Dr. William Dymock, for many years Medical Storekeeper for Bombay, had exceptional opportunities of studying the drugs coming into India from the Persian Gulf, and his great knowledge of oriental languages in addition to his medical and botanical training placed him in the front rank of Indian pharmacognosists. His "Vegetable Materia Medica of Western India" (1885), and later, his "Pharmacographia Indica," are storehouses of information on the trade, natural history and composition of oriental drugs. Use has also been made of the "Flora of Syria, Palestine and Sinai" by Rev. G. E. Post (1896), Boissier's "Flora Orientalis," and "A working list of the Flowering Plants of Baluchistan," by Mr. I. H. Burkill (1909). Notes made by Dr. Cowan on the medicinal properties of the drugs are indicated by (C).

Many useful notes on drugs and Persian and Turki names of North Persian plants occur in a series of Articles by B. Gilliat-Smith and W. B. Turrill in *K.B.* 1930, Nos. 7-10, entitled "On the Flora of the Nearer East: A contribution to our knowledge of the Flora of Azerbaidjan, North Persia."

As a practical result of these determinations the Empire Marketing Board desire to know if any of these products could provide new therapeutic agents for employment in western medical science. From a consideration of the list of 150 drugs it will be seen that most of them were mentioned by Abu Mansur one thousand years ago; several of them were prescribed by Avicenna and Dioscorides centuries before. It would seem that the drug supplies of this country, like the laws of the Medes and Persians, are unchangeable. The few products not mentioned by previous writers do not appear to have important properties; they include the thistle-down of a *Cirsium*, the fruits of a *Gaillardia*, the flowers of a *Stachys*, the stems of a *Linum*, and the seeds of a *Chenopodium*. "The Iranians were the great mediators between the West and the East, conveying the heritage of Hellenistic ideas to Central and Eastern Asia, and transmitting valuable plants and goods of China to the Mediterranean area" (B. Laufer). The standard drugs of Persia, such as tragacanth and the fragrant umbelliferous gum-resins, are in constant demand, and the trade in others may be increased as their virtues become more widely known. It should

be remarked that the specimens examined in the present enquiry were in a fresh condition and free from any fraudulent admixture. If further quantities should be required for chemical or physiological examination it would be easy to obtain them from the markets of Teheran and Hamadan.

Literature cited.

Achundow	See Introduction.
Ait.	= Notes on the products of W. Afghanistan and of N. E. Persia, by J. E. T. Aitchison (1890).
Boiss.	= Boissier, Flora Orientalis.
B.P.	= British Pharmacopoeia (1914).
Colloquios	by Garcia da Orta, Markham (1913).
Fl. Br. Ind.	= Flora of British India.
Gild. & Hoff.	= Volatile Oils, by Gildmeister and Hoffmann (1922).
I.H.B.	= Baluchistan Plants, by I. H. Burkill (1909).
Laufer	= Sino-Iranica (1919).
Makhzan-el-Adwiya	1769, reprinted 1824.
Ph. Ind.	= Pharmacographia Indica (1891).
Ph. Pers.	= Pharmacopoeia Persica (1681).
Pharm. Journ.	= Pharmaceutical Journal.
Pharmacog.	= Pharmacographia, by Flückiger & Hanbury (1874).
Post	= Flora of Syria, Palestine & Sinai (1896).
Schl.	= Schlimmer's Terminologie (1874).
Sci. Pa.	= Science Papers, by D. Hanbury (1876).
Tschirch	= Handbuch der Pharmakognosie (1912).
Wehmer	= Pflanzenstoffe (1919).
Wiesner	= Die Rohstoffe des Pflanzenreichs, ed. 4 (1927).
Y. B. Pharm.	= Year Book of Pharmacy.

Abbreviations of Languages cited.

Arab.	= Arabic.	Hind.	= Hindustani.
Bal.	= Baluchistan.	Lat.	= Latin.
Beng.	= Bengal.	Pers.	= Persian.
Bom.	= Bombay.	Port.	= Portuguese.
Fr.	= French.	Sans.	= Sanskrit.
Gr.	= Greek.	Syr.	= Syrian.
Guz.	= Guzerati.	Turki	= Turki.

Abrus precatorius Linn. (Leguminosae). The seeds.

Ain-el-dik, "Cock's eye" (Hamadan); Echechme khorouce (Schl.); Jequirity; Paternoster Seed; Indian wild liquorice.

Schl.; Fl. Br. Ind. ii. 175; Ph. Ind. i. 430.

The plant grows in India and is cosmopolitan in the tropics; the seeds are exported from India to Persia and other countries in the west. The well-known scarlet seeds, with a black spot at one

end, are made into necklaces and rosaries. They were formerly used as a standard weight by goldsmiths, the average weight of the seeds being 1·7 grains. The leaves and root contain a sugar (D. Hooper, Pharm. Journ. 1894, 937).

In medicine the seeds are said to have hilarant properties, and in Persia they are classified among the poisons. In India toxicological enquiries have shown that the seeds are ground into a paste, the paste is made into suis or needles, and these are inserted hypodermically in the bodies of cattle and bring about their death. Drs. Warden and Waddell in 1884 separated a protein body, called abrin, which is the active principle. Spica in 1888 called it a glucoside. Sidney Martin in 1889 found it to be a globulin or albumose. In 1891 Kobert described it as a toxalbumin.

Achillea Santolina Linn. (Compositae). Flowering tops.

Būmādrān (Teheran); Boi mazandran; Bui madaran (Pers.); Boe madran (Bal.); Birinjasaf (Ind. bazaars).

Ait. mss.; I.H.B.; Schl.; Boiss. ii. 266; Ph. Ind. ii. 272.

The dried herb with flower-heads sold in Teheran is collected about Senneh and the surrounding hills (C). The plant is widely distributed in the East and in Northern Africa. The flowers are arranged in corymbs. The heads are 5 mm. high and 3 mm. in diameter, the tubular flowers are yellow, and the involucre are covered with grey tomentose scales. They have a pleasant aroma. The flowering heads are used as a tonic and carminative in Persia and Sind. The strong odour of the herb drives away fleas and other noxious insects. In Baluchistan the drug is given to children for colic. Dymock says the Common Yarrow (*A. Millefolium* L.), growing in India, goes by the same name and has similar properties.

Adiantum Capillus-Veneris Linn. (Filices). The fern.

Kashburat (Teheran); Kashburat-el-bir, "Coriander of the wall" (Pers.); Pousia wechame (Schl.); Parsia washan (Pers.); Barr-i-sija waschan (Achundow 163); Kansburaj, Moohar-khas (Ind. bazaars).

Ait.; Post; Schl.; Ph. Ind. iii. 624.

The maiden-hair fern is found in Persia, Afghanistan, the North-Western Himalayas and Western China, but other species of fern are used medicinally and are called by similar names. The drug is said to be collected from walls around Teheran. The rhizome is the part used in medicine; it is credited with expectorant properties and is given for relieving difficult respiration.

Allium sativum Linn. (Liliaceae). The seeds.

Tukhm-i-tarra (Teheran, tarra—Persian for pot-herb). Garlic. Boiss. v. 229.

Under this name the small black, angular, corrugated seeds of an *Allium* are sold in Teheran. They are probably the seeds of the Garlic, which is *par excellence* the pot-herb of the East. Three kinds

of the plant are grown in Persia ; Bustani (garden), Bari (wild), and Kirathi (leek-like).

***Althaea lavateraefolia* DC.** (Malvaceae). The root.

Risha-i-khatmi (Hamadan) ; Rishah-i-khitmi (Ind.) ; Tibetche khetme (Schl.) ; Khutmi (Post).

Achundow ; Schl. ; Boiss. i. 828 ; Post ; Ait. ; I.H.B.

This plant grows in Egypt, Persia and Afghanistan. Aitchison says it is cultivated in North-Eastern Persia, not only for the showiness of its flowers, but for its petals, which are collected as they fall off the plant and are called gul-i-khatmi, and the seeds tukhm-i-khaira. In Baluchistan the flowers of *A. pallida* Wall. are called gul-i-khaira. The root, seeds, and flowers of these malvaceous plants are all used in medicine and are occasionally exported. The root from Hamadan agrees with that of *L. lavateraefolia*, but Achundow refers the drug to *A. ficifolia* Cav. and Schlimmer to *A. officinalis* Linn. The root is fibrous, light-coloured, and becomes mucilaginous when soaked in water. It is considered strengthening. It is probably a Persian substitute for the root of the Marshmallow of Europe (*Althaea officinalis*).

***Alyssum campestre* Linn.** (Cruciferae). The seeds.

Hodame (Teheran) ; Qodumah (Pers.) ; Ghodaoumehe chirazi, Touderi, Djensidge (Schl.) ; Hedge Garlic ; *Erysimum officinale* = *Sisymbrium officinale* in Schlimmer's Terminologie.

The seeds are light-brown, lens-shaped, 2 by 1.5 mm., with yellowish-grey border ; they become coated with semi-opaque mucilage when placed in water. Preparations of the seeds are given in chest complaints (C).

***Anethum graveolens* Linn.** (Umbelliferae). The fruits.

Shua, shuvit (Pers.) ; Sowa (Hind.) ; Suva, shepu (Bom.) ; Shibbit (Arab.) ; Anitum (Yunani) ; Dill seed.

Dill is a pot-herb in Persia, and the fruits are sold in the bazaars and used as a carminative.

***Anthemis Wiedemanniana* F. & M.** (Compositae). Flowerheads.

Gul-i-banoi (Hamadan) ; Banoi, probably a contraction of Bābūna or Babunij, a name for the chamomile and other fragrant medicinal composites used in the East. Babunah is a village in Arabia, where *Matricaria Chamomilla* was once abundant.

Achundow ; Ait. ; Post ; Schl. ; Boiss. ii. 286 ; Pharmacographia 346 ; Ph. Ind. ii. 275 ; I.H.B.

Schlimmer refers Babuneh shirazi to the Roman Chamomile (*A. nobilis*), and says it is cultivated on a large scale in gardens, and is administered, as in Europe, for its tonic qualities. Post attributes Babunij to *Achillea fragrantissima* Forsk. and *Matricaria aurea* Linn. ; the latter is a fragrant plant, an infusion of which is used as a febrifuge and carminative.

The chamomiles of the Indian Bazaars, which are brought from Persia and known as Babunah, are the flowers of *M. suaveolens* L., a slender form of *M. Chamomilla* growing in South Russia, Persia, and Siberia. In Baluchistan *A. Gayana* Boiss. and *A. odontostephanus* Boiss. are used medicinally. Out of 93 species of *Anthemis* enumerated in Flora Orientalis Wiedemann's Chamomile of Syria, Asia Minor, and Persia, affords the drug in the Hamadan bazaar. The flower-heads are recognised by their small size (1 cm. across), the conical receptacle, and carinate palea; they are bitter and have an agreeable fragrance.

Arctium Lappa Linn. (Compositae). The root.

Bardane (Teheran); Semen Bardanae (English Herbal 1730).

The Burdock plant is found in Syria, Persia, and Khorasan, as well as in Europe. The root under the name of Risha Baba Adam or "Root of Father Adam" is quoted in Schlimmer's 'Terminologie.' It is regarded throughout India as depurative and antiphlogistic. In Teheran the root, with that of sarsaparilla, is used as a remedy for syphilis. The drug has had a considerable reputation in ancient times, but from a chemical examination by Zellner (1924) there is no indication of any substance in the root being physiologically active.

Aristolochia longa Linn. (Aristolochiaceae). The root.

Zarawand (Hamadan); Zarawand-i-tawil (Pers.); Zirawande thewile (Schl.).

Achundow; Schl.; Ph. Pers.; Post; Ph. Ind. iii. 165.

The roots of this and other species of Birthwort are highly valued medicines in the East. The drug from Hamadan is the cylindrical root, 13 mm. in diameter, showing in section the peculiar wedge-shaped bundles of the wood. It has a somewhat bitter taste. The Aristolochias are stimulating tonics and are often given for snake bites. Locally the root is used for amenorrhoea and as a pectoral and stomachic.

Artemisia maritima Linn. (Compositae). Flower-heads.

Dharmane (Teheran); Darmanah (Pers.); Afsatin el bahr (Arab.). Ph. Ind. ii. 288; Greenish and Maplethorpe, Y.B. Pharm. 1923, 646.

Aitchison states that *A. maritima* and *A. campestris* exist everywhere in N.E. Persia over the dry and stony country, forming the chief fodder for cattle. Camels and donkeys thrive on them. The root-stocks and dry stems are the mainstay of the traveller for fuel. The flower-heads are collected from the villages around Teheran and sold as a vermifuge. The Indian supplies come from Afghanistan and Persia. The local product was used by Dr. Sayed during the war, when santonin could not be procured in Teheran, and both seeds and leaves were found effective. A mixture of Dharmane and Absinthe is said to be much more active than flowers of *Artemisia* alone. L. Simonsen examined the leaves and flowering tops of *A. maritima* (*A. brevifolia* Wall.) growing in Chitral, Afghanistan, and Baluchistan, and found from 0 to 1 per cent. of santonin.

There is more in the herb when the flowers are just appearing (Pharm. Journ. 1923 : 4, 57-63). Levant wormseed of European commerce comes from Persia and Asia Minor. It is also collected from a variable plant in the Himalayas, Kashmir, and Western Tibet.

Artemisia vulgaris Linn. (Compositae). Flower heads and leaves.

Absint (Teheran) ; Absentin (Pers.) ; Afsantin or Absanthin (Ait.) ; Afsintin roumi (Schl.).

Ph. Ind. ii. 284.

The origin of this ancient drug, described by Mohammedan physicians, is probably *A. Absinthium* Linn., but no doubt other species are used, including *A. vulgaris* and its varieties. *A. ponticum* Linn. is quoted by Schlimmer as the source of the drug sold in his day in Teheran ; this is a plant growing in Europe, the Caucasian region, and Songaria. Achundow states that the Persian drug is obtained from Roman, Indian, and Nabatean sources. *A. Sieversiana* Willd. is one of the Indian kinds of afsantin said to be imported from Persia. The sample of afsantin from Teheran is a mixture of flower-heads, stalks, leaves, and mineral impurities. It is used as a tonic and is regarded as a very efficient vermifuge. The Persian name of these plants has been given to absinthe, a well-known liqueur used on the Continent.

Asparagus adscendens Roxb., and other species. (Liliaceae). The root.

Khushak (Hamadan) ; Kushak, merchubeh (Pers.) ; Isferaj (Ar.) ; Satavar, Satar mul, Shakakula micari (Hind.) ; Sufed musli of commerce (Bom.).

Ait. ; Schl. ; Post ; Boiss. v. 339 ; Ph. Ind. iii. 482.

The roots of several species of *Asparagus* are used in the East in medicine. Besides the above species, found in Afghanistan and Persia, *A. sarmentosus* Willd., *A. officinalis* Linn. and *A. racemosus* Willd. have been identified as the origin of some of these drugs from India. The fruits are also medicinal and are sold in the bazaars under the Arabic name Haliyun. The root from Hamadan is in long thin pieces, 2-3 mm. in diameter, ivory-white, hard, horny, wrinkled longitudinally, and somewhat twisted. It swells in water and becomes mucilaginous ; it has a mawkish, sweet taste, and hardly any odour. The root is considered to have stimulant and diaphoretic properties.

Asperugo procumbens Linn. (Boraginaceae). The flowers.

Badranj-boia (Teheran) ; Badrandj buya (Pers.).

Schl. ; Boiss. iv. 275 ; Post, 540 ; I.H.B.

This is a prostrate herb in Arabia, Persia, Afghanistan, Baluchistan, Europe, and North Africa. It is common in cultivated fields and gardens. The fruiting calyx is reticulate-veined with acute, ciliate lobes ; the pedicels are bent, the nutlets are oval, flat and warty.

The substitution of this plant for the well-known fragrant drug Badrandj-boia still persists in Persia. Schlimmer, writing under *Asperugo*, says " This plant, dried, is sold by the druggists of Teheran under the false name of Badrendj-bou-yeh, which is the true name of *Melissa cedronella*. I have never been able to understand the reason of this sophistication, to which Dr. Haussknecht was the first to call attention, because the true *Melissa* is largely cultivated in the gardens around Teheran." See *Dracocephalum Moldavica* (p. 315).

Astragalus fasciculaefolius Boiss. (Leguminosae). The gum.

Kundjida (Teheran); Kunjad, Gujar (Bomb.); Khunjada, " resin for bleeding," (Ait.); Anzarut (Arab.); Sarcocolla, " flesh glue " (Greek); Kohl Farsi=Persian Collyrium, Kohl Kirmani=Kirman Collyrium.

Ait. 18; Ph. Ind. i. 476; D. Hooper, Journ. As. Soc. Bengal, Vol. ix. No. 4, April 1913, pp. 177-181; Achundow; Schl.; Boiss. ii. 396.

This is a sweet exudation secreted by the above plant obtained from Kurdistan and exported to India and elsewhere. It occurs in pale yellowish-brown fragments, brittle in consistency, soluble in water and alcohol, with a sweetish taste and odourless. It contains a sweetish principle similar to glycyrrhizin.

Sarcocolla forms a plaster long used by Parsi bone-setters, and is applied locally to the ears and face to allay neuralgic pains. Aitchison says the gum is used by ladies of the harem to improve their appearance and to give the skin a gloss.

Berberis vulgaris Linn., and other species. (Berberidaceae). The fruits.

Zirishk (Hamadan); Zarishk (Pers., Hind., Bom.); Zerechke (Schl.); Karoskai (Bal.).

Achundow; Ait.; Schl.; Boiss. i. 103; Ph. Ind. i. 65.

The Barberry is a common shrub growing at altitudes of 2000 ft. and upwards. The fruit is largely collected and consumed locally. It is also exported in quantity to India, where it is highly appreciated as a condiment. Dr. Cowan noticed *B. densiflora* Boiss. occurring in the North West of Persia, with broader berries than those of *B. vulgaris*; the fruits of both species are made into jam. In the Punjab the fruit and preserve is called Zirishk-tursh, to distinguish it in the trade from the small, dried, black grapes, known in Europe as currants or corinths (Aitchison).

The fruits (berries) are oblong, with an acid pulp and oblong seed. They contain dextrose, laevulose, and gum, and the unripe fruits contain berberine. Their consumption is said to remove itch and other skin complaints.

Calamintha graveolens Benth. (Labiatae). The seeds.

Ferenghi meak (Teheran); Frendje meehke (= *Melissa Calamintha*, Schl.); Faranj mishk or Biranj mishk (Arabic form of the Persian name); Palang mishk, which Dr. Dymock refers to *Ocimum*

sanctum Linn. (Ph. Ind. iii. 90). Pelenquemecke is referred by Schlimmer to another labiate, *Dracocephalum Kotschyi*.

Boiss. iv. 583 ; Post, 624.

This species of Calamint frequents the Mediterranean region, Syria, Asia Minor, Iraq, and the Transcaucasus. The seeds from Teheran are said to be brought from Shiraz ; they were grown at Kew and identified as above. The drug is known in India, where supplies come from Persia.

The seeds are dark-brown and oblong in shape ; 2 by 1 mm., three-angled, tapering towards the umbilicus, where there is a white V-shaped mark ; they are feebly pungent, and become coated with transparent mucilage when soaked in water. The seeds are stimulating and aphrodisiac.

Capparis spinosa Linn. (Capparidaceae). The root and root-bark.

Risha Kavar (Teheran) ; Risha Kabar (Hamadan) ; Keber (Schl.) ; Capparis Cortex Radicis (Ph. Pers.).

Ph. Ind. i. 131 ; Boiss. i. 420.

The thorny Caper plant is found in Western Asia, Europe, North Africa, and Australia. According to Dr. Aitchison it is a common shrub from Quetta to Meshad, in the open country forming great bushes fully five feet high. In Persia, Dr. Cowan observed it as a low straggling bush often with stems trailing along the ground. *C. aphylla* Roth is very abundant in Baluchistan, where it is called by the same vernacular name (I.H.B.).

The flower-buds all through Persia are collected for household use to be made into pickles. The light-coloured root and the thick root-bark, in half quills, are used in medicine. These drugs have been introduced into India by Mohammedans, and are exported *via* the Persian Gulf. The root and root-bark are pungent and bitter, and are given for intermittent fever and rheumatism.

Carthamus tinctorius Linn. (Compositae). Achenes.

Kaufsha, Qushon (Hamadan) ; Tukhm-i-kaphah, Tukhm-i-kaphek (Pers.) ; Tokhme-kaficheh, idiom in Guilan (Schl.) ; Karophi (Bom.) ; Qurtum (Arab.) ; Kusum (Hind.) ; Atractus (Gr.), Safflower or Parrot seed.

Ait. ; Post ; Schl. ; Sino-Iranica, 324 ; Ph. Ind. ii. 308.

The Safflower is cultivated in Syria, Persia, and Afghanistan, as a field crop, for its red anthers, which are used as a dyestuff and cosmetic.

The fruits or achenes, of the size of barley grains, are kept in all druggists' shops. They yield an oil by expression which is good for rheumatism.

Carum copticum Benth. & Hook. (*Sison Ammi* Linn., *Trachyspermum Ammi* Sprague ex Turrill ; *Ptychotis Ajowan* DC. ; *Ammi copticum* Linn.). (Umbelliferae). The fruits.

Zinian (Teheran & Hamadan) ; Ajowan, Ajwain (Hind.) ; Omum (Tam.) ; Ammeos (Ph. Pers.) ; Komoune molouki (Schl.) ; Basilikon Kuminon (Gr.) ; Sium Ammi ; Bishop's weed.

Boiss. ii. 898 ; Fl. Br. Ind. ii. 682 ; Ph. Ind. ii. 116.

This is an African plant cultivated in Egypt, Persia, Afghanistan, and throughout India. The aromatic fruits were a well-known medicine among the ancient Greeks and Arabs, and still enjoy a great reputation in the East. The Persian drug is produced largely in the province of Shiraz. The fruits are brownish-grey and smaller and more curved than caraway seed. The fragrance and active principle of the drug reside in the 3 to 4 per cent. of essential oil which they contain. The oil holds a stearopten called thymol which crystallizes out at ordinary temperatures. Of the remaining portion half is thymene, a mixture of cumene and several terpenes. Thymol is known in India as Ajwain-ka-phul or Flowers of Ajwain. The distillate obtained when the fruits are boiled with water is called " Omum water," and is used as a carminative for children and as a cholera remedy.

Cassia Absus Linn. (Leguminosae). The seeds.

Cheshum (Hamadan) ; Chashum, cheshmak, chashmizak (Pers.) ; Hebbel soudane, Hab-us-sudan (Arab.) ; Chaksu seed of India ; Egyptian Cassia seed.

Ph. Ind. i. 524 ; Fl. Br. Ind. ii. 265.

This is a plant widely distributed in the tropics of the old world. The small, black, lens-shaped seeds have long been known in the East in the treatment of eye diseases. In some books a plaster made of the seeds is recommended as an application to wounds and sores. In Hamadan the seeds are classed among the poisons (C).

Centaurea Behen Linn. (Compositae). The root.

Rishe bahman (Hamadan) ; Bahman, behmen, barham (India) ; the name is supposed to be derived from Brahma as a drug given to convey superior intelligence.

Ait. ; Post ; Boiss. iii. 682 ; Ph. Ind. ii. 303.

The plant grows in Persia, Syria, and Armenia. Boissier speaks of Bahman coming from the hills of Khorasan. Aitchison says it is a medicine from Kabul exported into India.

There are two kinds of this drug, Sufed (white) and Surkh (red) Bahman. The root from Hamadan appears to be the latter. The root is in short pieces, cylindrical, about 2.5 cm. in diameter, with a scaly crown, reddish-brown, scabrous, marked by numerous circular wrinkles externally ; within, the wood is dull red and with yellowish, horny layers, and no starch. This drug does not appear to be the same as Red Rhapontic, which has been referred to the root of a paeony.

Chenopodium capitatum Aschers. (Chenopodiaceae). The seeds.

Tukhm-isfanj (Pers.).

The seeds of this species of goosefoot are sold as a food-grain and medicine, and the plant is used as a pot-herb. The seeds are black, rounded and disc-shaped, 1 mm. in diameter. In mountain areas in South America the seed of *C. Quinoa* Willd. has long been known as a cereal, and supplies food where other food crops cannot easily be grown.

Cichorium Intybus Linn. (Compositae). The root and achenes.

Risha-kashni (Hamadan); Tukhm-kashni (Ham. & Teheran); Kashi (Hind., Bom. & Beng.); Intubus (Rom.); Sem. Cichorii (Pharm. Pers.).

Ph. Ind. ii. 311; Boiss. ii. 716; I.H.B.

The Chicory plant is indigenous to Persia, and is cultivated in Europe and India. It is a common weed over all well-cultivated land in the vicinity of water-courses and wherever there is damp, clay soil. It goes under the same name as the Endive, and the natives of East Persia do not distinguish between them (Aitchison).

The root is fleshy and tapering, wrinkled longitudinally, light-brown externally, and whitish within. The dried and torrefied root is well known as an article for mixing with commercial brands of coffee. In Persia, Baluchistan, and India it is a resolvent and cooling medicine for bilious attacks. The achenes are angled, of a pale, mottled-grey colour, and with a bitter and mucilaginous taste. They also are considered a cooling medicine.

Cirsium lanceolatum Linn. (Compositae). Thistle-down.

Foveh (Hamadan).

Achundow; Boiss. ii. 538; Post.

This species of Thistle is frequent in Syria, Persia, Afghanistan, and Kurdistan.

The drug consists of the white feathery pappus, 3 cm. long, of the dense capitula of this plant. With it are mixed a few tubular florets and a few linear-oblong, compressed, smooth achenes. They are said to be used locally for gonorrhoea.

Schlimmer refers to a medicine called "Badawerde" (=carried by the wind), consisting of the pappus of the Holy Thistle (*Carduus benedictus*). In India the downy heads of *Volutarella divaricata* Benth. are used as a drug (Ph. Ind. ii. 306). Badaward has also been referred to *Echinops candidus* (now *E. Cephalotes* DC.), a true Persian plant. It is unusual for a drug consisting of cellulose to be used internally. Probably it is for external application. In India the soft, woolly inflorescence of the male spadix of a bullrush (*Typha angustifolia* Linn.) is applied, like cotton, to wounds and ulcers (Ph. Ind. iii. 538).

Citrus Aurantium Linn. (Rutaceae). The flowers.

Bahār-i-narendj, 'Spice of orange' (Teheran); Behare narundj, Naphae flores (Schl.); orange flowers.

Ph. Ind. i. 270.

The dried flowers of the cultivated orange growing in Persia are sold in the bazaars and are recommended as a stomachic. Neroli oil and orange-flower water, obtained by distillation, are used in perfume and for medicine. Schlimmer in his Terminologie refers to Aqua florum aurantii or Aqua naphae as a favourite flavouring agent. The oil contains a nitrogenous substance of exceeding fragrance called anthranilic acid methyl-ester.

Colchicum luteum Baker, and **C. speciosum** Stev. (Liliaceae).
The corms.

Sulenjan (Teheran); Surinjan-i-talkh (Pers.); Schanbelid; Hermodactyl, the finger of Hermes (Gr.).

Achundow; Ph. Pers.; Boiss. v. 155; Schl.; Ait.; Ph. Ind. iii. 496.

The yellow-flowered *Colchicum* is found on grassy slopes in the temperate Himalaya and Kasknir, Afghanistan, and Turkestan.

C. speciosum is met with throughout the Badghis, Harirud, and Khorasan. The corms or bulbous roots are mixed with those of *Merendera persica* and constitute the Hermodactyls of the later Greeks (Aitchison). The roots of both plants are used in Persia. The Indian drug appears to be the corms of *C. luteum* imported from Kashmir. The corms are ovate, 3.5 to 5 cm. long, white, hard, and horny. The starch is muller-shaped with a hilum. Both species afford the alkaloid colchicine, and are used, as *C. autumnale* in Europe, for rheumatism.

Commiphora Molmol Engl. (Burseraceae). Oleo-gum-resin.

Murr-e-makki (Teheran); Mur, bol (Hind. & Bom.); Myrrha mechensis (Ph. Pers.).

Abu Mansur; Schl.; Pharmacog., 125; Ait.; Ph. Ind. i. 304.

This fragrant oleo-gum-resin, known as Myrrh, is one of the most ancient drugs in the orient. It is obtained from plants growing in North-east Africa and South Arabia and is brought to India, where Bombay is the centre of the trade. Aitchison says it is imported into Meshed through Persia for further transit to Afghanistan and Turkistan. Myrrh is an important drug among Mahommedans, who suppose that it originally came from Mecca. It is used as a stomachic.

Commiphora Mukul Engl. and other species. (Burseraceae).
Gum-resin.

Mukul-agrak (Teheran); Moghl-ezregh (Schl.); Bdelium (Pers.); Indian Bdelium.

Ph. Pers.; Tschirch; Pharmacographia; Ph. Ind. i. 311.

The Mohammedans describe the different kinds of Bdelium under the name of Mukul, and say that it is the produce of a tree common in Arabia and also in India. Several kinds are distinguished, all of them bitter. That with a reddish tinge is termed Mukul-i-azrak; with a yellowish-tinge, Mukul-i-yahud; brown, Sakulali; and with a rich red-brown colour, Mukul-i-Arabi. Gum-resins from trees in the arid

zones of Sind, Kathiawar, and Rajputana are used as substitutes for the African and Arabian Bdeliums. Aitchison says the Bdelium in the bazaars of Afghanistan is imported, but adds that fragrant gum-resins obtained from spurious shrubs in dry desert regions are indistinguishable from the imported product. The Persian sample is sticky and bitter, and forms a milky emulsion with water. The medicinal properties of Bdelium are regarded as the same as those of myrrh, and the drug is given in muscular rheumatism and is applied to painful parts in the form of "lep."

Conium maculatum Linn. (Umbelliferae). The fruits.

Karedemonah (Hamadan); Kirdamana (Bom.); Choquerane, Bikhe sifti (Schl.); Hemlock fruits.

Boiss. ii. 922; Ph. Ind. ii. 110.

The Hemlock is a poisonous British plant distributed in Europe and Northern Asia, but not in India.

Aitchison met with the plant, fully seven feet in height, in Karobagh in North-eastern Persia.

Arabian and Persian physicians repeat in their writings the opinion of the Greeks in regard to Hemlock.

The fruits and leaves contain a poisonous alkaloid—conine—which paralyses the motor nerves. The fruits are one of the poisons of Persia and are used locally as a lotion to allay pain.

Cordia Myxa Linn. (Boraginaceae). The fruits.

Sepestan (Teheran); Sebestan or Sapistan, from Sagpistan, "Dog's dugs" (Pers.); Sebestan plums.

Achundow; Ph. Pers.; Schl.; Post 532; Boiss. iv. 124; Ait.; I.H.B.; Ph. Ind. ii. 518; Cordia Myxa and allied species, J. Hutchinson, Kew Bull., 1918, 217.

Cordia Myxa, the Arbor glutinosa of Rumphius, is a common shrub or small tree frequently cultivated, and found in regions extending from Egypt to Cochin-China and Tropical Africa. The Sapistan is a well-known drug in the orient, introduced by the Arabians. It is a drupe of the size of a cherry with mucilaginous properties, and is sometimes used in making birdlime. Aitchison says the fruits are chiefly imported from Southern Persia to be employed in medicine, and are forwarded in quantity to Turkestan. On account of their demulcent properties they are useful for coughs and chest complaints.

Coriandrum sativum Linn. (Umbelliferae). The fruits.

Tukhm-i-kashniz (Teheran); Kuzbura, kozbara (Arab.); Kisniz, Kosniz (Pers.); Gashnish (Turki); Kostumbari (Sans.); Dhanya (Hind.); Koriyan (Gr.); Coriander seed.

Achundow; Schl.; Laufer; Fl. Br. Ind. ii. 177; Ph. Ind. ii. 129.

The Coriander plant is cultivated as a pot-herb and for its fruits in gardens throughout Persia, Afghanistan, and India. The globular

fruits are a well-known spice and flavouring agent. The plant is used in salads.

The principal constituent of the essential oil of the fruit is coriandrol, the dextro-gyrate modification of linalol.

Crataegus orientalis Bieb. (Rosaceae). The fruits.

Gwich (Hamadan); Kewiche (Ispahan); Kocha, gohja, kohela, alaf-kharez (Afg.); Naguncha, ghunza (Bal.).

Schl.; Boiss. ii. 660; Post; Aitchison; I.H.B.

The Oriental Hawthorn is a shrub or small tree of Asia Minor and the Caucasus. This and other species grow at an elevation of 3000 ft. and upwards, and are common at the heads of springs in the lower hills; they provide an excellent fodder for goats, sheep, and camels. The wood is valuable for the manufacture of spinning wheels. The fruits of most species are used in medicine. The fruit of *C. Azarolus* Linn., a tree of Persia and Asia Minor, is the Lu'rur of Achundow: Schlimmer notices the fruits of *C. oxyacantha* Linn. and *C. melano-carpa* in his list of Persian drugs. The fruits from Hamadan are pome-like, rounded, 12 mm. across, with a reddish-brown, wrinkled pericarp, surmounted by an umbilicate disc, and minute lobes of the calyx; within are three oval, light-brown, hard pyrenes. The fruits contain sugar, and are supposed to act as an opiate (C), whilst the seeds are given for spermatorrhoea.

Croton Tiglium Linn. (Euphorbiaceae). The seeds.

Habb-el-salatin, "Sultan's seeds" (Hamadan); Habb-el-khatai, "Cathay (China) seeds"; Bidend jireh khatai, "Castor-oil seeds from China," Habb-dilmaluk (Ait.); Jamalgota (Punj.).

Ait.; Schl.; Ph. Ind. iii. 281.

This is a small tree indigenous to China and N.E. India, now under cultivation throughout the greater part of India and the East.

Croton seeds were known to the Persians at a very early date and were doubtless introduced from China by the caravan route through Central Asia. They were described by Acosta in 1578, and called Pinones de Malaca. They are now imported from India.

They are oblong, 12 mm. long by 9 mm. broad, with dorsal and ventral surface arched. The testa is black, covered with a brown membrane; the oily albumen is enclosed in a delicate white membrane, and has two foliar cotyledons. The seeds contain a violently purgative oil, and are classified by the Persians among the poisons.

Cucurbita Pepo DC. (Cucurbitaceae). The flowers.

Gul-i-Kadu (Hamadan and Teheran); Kadu (Hind.).

Ait.; Schl.; Fl. Br. Ind. ii. 622.

The Pumpkin is largely cultivated as a vegetable in Persia and Afghanistan. The seeds provide the usual medicinal product of this plant, but the flowers, chiefly corollas, are sold in the bazaars of Teheran and Hamadan; they are yellow in colour and about 3.5 cm. long. The flowers are made into a decoction and applied to

the face to improve the complexion. They are also administered for chest troubles (C).

Cuminum Cyminum *Linn.* (Umbelliferae). The fruits.

Goi-Zira, "Green-Weed" (Turki, in Tabriz); Zira (Hind.); Jira (Beng. & Bom.); Cammun (Syr.).

Post 373; Gilliat-Smith & Turrill, *Kew Bull.* 1930, 390; *Ph. Ind.* ii. 113.

The Cummin plant is grown in gardens as a pot-herb, and the seeds, or properly fruits, are sold in the Persian bazaars as a condiment and medicine (Gilliat-Smith). There are three kinds of cummin recorded by Persian and Arabian writers; Kamun Farsi or Persian, Kamun Nabli or Nabatean (N.W. Arabia), and Kamun Kirmani or Black Cummin. The latter is probably the product of *Carum nigrum* Royle.

Cummin is a favourite condiment in India and other Eastern countries. From the cradle of civilisation in Egypt its use has spread to Arabia, Persia, India and China.

Cuscuta hyalina *Roth.* (Convolvulaceae). The herb, flowers, and seeds.

Gul-i-geushush (Hamadan), Flowers; Geshush, Kasus (Hamadan), Herb; Aftimun (Teheran), Flowers and seeds; Kochouce (Pers. lit.); Kushooth is the Arabic name for dodder. Kassutha (Gr.), *Cuscuta* (Lat.), hence Keshus (Pers.); "Kill weed."

Boiss. iv. 117; *Ph. Ind.* i. 548; *Sci. pa.* 240.

Of the above three samples of Persian drugs those from Hamadan appear to belong to *C. hyalina*. Gul-i-kasus (the flowers) and Tukhm-i-kasus (the fruits) are exported from Persia to India mixed with the leaves and spines of the plants on which they grow. The seeds are light-brown and have a bitter taste. The flowers are given for asthma and the thin filamentous stems for obesity. The drug Aftimun (*Epitymon*, Gr.), growing on a malvaceous plant, has larger flowers, and is probably derived from *C. europaea*, a native of Europe and Western and Central Asia. It is given as a digestive and purifier of the blood, just as in Europe dodder is an ancient remedy for intestinal disorders as constipation and flatulence.

Cymbopogon Schoenanthus *Spreng.* (Gramineae). Stems and leaves.

Azkar (Teheran); Izkhir (Arab.); Khavi (Hind.); *Juncus odoratus*; *Herba Schoenanthi*; Camel grass.

Ph. Pers.; *Schl.*; *Ph. Ind.* iii. 557; Oil-grasses of India and Ceylon, by O. Stapf, *Kew Bull.*, 1906, 297.

The drug sent under this name is intended to represent the Persian and Indian drug Ishkar or Izkhir-i-jami, the stem and root of a fragrant grass introduced originally from Arabia. But the drug, although fragrant, consisting of the lower part of a leafy stem with a few wiry rootlets, could not be botanically recognised as a

grass. Kaempfer in his Travels in Persia in 1683-1688 speaks of the distillation of the oil from the grass Izkhir (Amoen. Exot. 1712). Preparations of the fragrant oil-grasses are used locally for debility.

Cynara Scolymus Linn. (Compositae). The fruits.

Kangar (Teheran); Kinguere (Schl.); Ardi-shauki (Arab.); Enghinar (Turki); Artichoke seeds.

Achundow; Boiss. iii. 557.

The Artichoke is a cultivated plant in Persia. The hard, white, polished fruits or achenes are used in medicine. They are called in some books kunghir, but according to Gilliat-Smith kangar is a name in Persia applied to almost any thistle. Aitchison believes that this name must have originated from the Persian name of the allied plant, the Prickly Artichoke (*Gundulea Tournefortii* Linn.). This plant, according to Schlimmer, exudes an emetic resin (Kangar-zad), which is used medicinally. Another plant, *Cirsium yamense* Turill, is called Kangar in Tabriz, where the underground shoots are eaten in the spring and called "artichoke" by the European Colony (Gilliat-Smith). The fruits in this collection, however, are those of the ordinary artichoke.

Cyperus rotundus Linn. (Cyperaceae). The tubers.

So-ad (Hamadan); Suad, Su'd (Pers.); Seid (Sudan); Motha (Hind.); Mustaka (Sans.); Muschk-i-zemin, earth musk; Rad. junci odorati (Ph. Pers.); Hsiang fu (Chin.).

Achundow; Ph. Pers.; Ph. Ind. iii. 552.

This sedge grows plentifully in moist or boggy ground. The small, dark, hairy tubercles are ovate-oblong, pointed at both ends, about 2.5 cm. or less in length, brown, hard, and horny. They have a somewhat lemon-like fragrance.

These tubers, known throughout Asia for their perfume and medicinal properties, are used for cleaning the teeth, and are placed among clothes to keep away insects. Their general action is tonic, stimulating, and stomachic.

Datura Stramonium Linn. (Solanaceae). Seeds and leaves.

Tukhm-tatulah (Pers.); Dhatura (Hind.); Jouj macel (Arab.); Shinah azghi (Bal.); Stramonium.

Ait.; Ph. Ind. ii. 586; Y.B. Pharm. 1927, 49; Synopsis of Genus Datura, W. E. Safford, Journ. Wash. Acad. Sci., 19 Apr. 1921.

The Thorn-Apple inhabits North, Central, and South America, and was introduced at a very early date into the warm regions of Europe, Asia and Africa. This species is a weed in Persia, and the name has been borrowed from other countries. Specimens of the seeds came from the bazaars of Teheran and Hamadan, and leaves from Hamadan, where they are sold among other drugs. Both seeds and leaves are used as poultices to allay pain. The natives recognise the poisonous properties of the seeds, and sometimes called them Kachola, the name for the seeds of *Nux vomica*, as both are used for

killing dogs. They contain the alkaloid hyoscyamine with small quantities of atropine.

Doronicum Pardalianches *Linn.* (Compositae). The root.

Darunech (Hamadan); Darunej-i-akrabi (Pers.); Darounedge eghrebi (Schl.); Doronic (Gr.); Doronicum Graeci (Ph. Pers.); Doronicum root.

Achundow; Boiss. iii. 379; Makhjan-el-Adwiya; Ph. Ind. ii. 292; Kew Museum.

This ancient drug is said to have come originally from Greece and Syria. *D. scorpioides* Lam. affords some supplies of the drug, while *D. Falconeri* C. B. Cl., of the Himalayan region, has been identified as the origin of samples of the drug in India. It is a peculiar knotted root, like the tail of a scorpion, and white, like alabaster. It contains inulin instead of starch, and is acrid and bitter. In Persia it is regarded as poisonous. It is useful in nervous depression, and is prescribed, according to the law of signatures, for persons bitten by scorpions and insects.

Dracocephalum Moldavica *Linn.* (Labiateae). Herb and seeds.

Badranj-buya (Teheran); Badirash-bu (Tabriz); Badrendj-bou-yih (Schl.); Baklat-el-utrujuya (Arab.). The Persian name means "the scented remedy for flatulent colic."

Achundow; Boiss. iv. 672; Ait.; Schl.; Ph. Ind. iii. 117.

Badrandj-buya is an important drug in Persia, and has been variously referred to species of *Nepeta*, *Calamintha* and *Melissa*, plants having the odour of balm. Achundow determined the source as *Melissa officinalis*. Aitchinson says the drug consists of the seeds of a labiate, while Dymock describes it as the flowers and seeds of a hyssop. The drug from Teheran is a mixture of broken stalks and seeds with some gland-dotted leaves. From Tabriz Mr. Gilliat-Smith sent seeds of the above-mentioned species of *Dracocephalum* under the same vernacular name, thus confirming the identification of Schlimmer in 1874. The seeds are black, somewhat torpedo-shaped, 2 mm. long, with a white V-shaped mark at the pointed end. They afford an opaque mucilage when soaked in water. The drug is esteemed locally, and is exported to India and elsewhere as a carminative and tonic. For another source of this drug see *Asperugo procumbens*.

Echinops persicus *Stev.*, and other spp. (Compositae). Cocoon cases of a beetle.

Schakar tighal, "Sugar of nests" (Pers.); Chek kere tighal (Schl.); Gol tighol of Royle; Tréhala manna.

Ph. Pers. 1681, p. 361; D. Hanbury, Journ. Linn. Soc. 16 Dec. 1858; Science Papers, 158-164; Schl.; Apping, 1885; Ebert, 1909; Tschirch, 1912.

Tréhala is a sweet substance found in cocoons of a beetle occurring on the leaves and stalks of *Echinops persicus* and other species of *Echinops* found in Persia, Turkey, and Caucasus. The beetle is

Larinus maculatus Fald (Guldigul, Pers.), one of the Curculionideae. This insect forms a rough, chalky-looking nidus or cocoon, rounded-oval, 18–20 mm. long, yellowish-white, rough on the outside and smooth within. The cocoon contains from 15 to 23 per cent. of a special sugar, called by Berthelot trehalose, identical with mycose, the sugar of certain Fungi. Besides sugar there is present mucilage, amyloextrin and cellulose. This peculiar secretion, known since the time of Avicenna, is given in Hamadan for coughs and to relieve the respiratory organs.

Echium plantagineum Linn. (Boraginaceae). The corollas.

Gul-i-gao-zaban (Teheran); the Persian name means “Flowers of cow’s tongue”; Flowers of Bugloss.

Boiss. iv. 208.

According to Dr. Aitchison the drug, under this Persian name, has been supplied by *Caccinia glauca* Savi and *Onosma macrocephala* DC. Schlimmer refers the origin of the drug to *Anchusa italica*, but remarks that druggists mix it with the flowers of *A. hybrida*. Dymock says the leaves and flowers of *Trichodesma molle* DC. come to Bombay under this name (Ph. Ind. ii. 521 and Appendix). In Baluchistan the drug is referred to *T. indicum* R. Br. (I.H.B.). In Sind it has been obtained from *T. zeylanicum* Br. It thus seems that Gul-i-gao-zaban is a generic name for the blue flowers of the Borage family. The above species of *Echium* occurs in Asia Minor, Transcaucasia, and North Africa. The blue corollas from Teheran belong to this species; they are 3 cm. long, 12 mm. wide at the throat, funnel-shaped, almost bilabiate, and slightly hairy. The flowers are considered a very good cardiac, tonic, demulcent, and laxative (C).

Embelia Ribes Burm. f. (Myrsinaceae). The berries.

Biranj-i-Kabuli (Teheran); Barhang-i-Kabuli (Pers.); Berengue Kaboli (Schl.); Baberang (Hind.); Embely currants.

Fl. Br. Ind. iii. 513; Schl.; Ph. Ind. ii. 349.

This shrub grows throughout India. The fruits are an ancient medicine in the East. Susruta described the anthelmintic properties of the fruits, which were given the Sanskrit name Vrishā-nasana, “destroyer of enemy” (worm). The drug is referred to in all Mohammedan works of medicine, and Rheede, Ainslie, Roxburgh, and Royle have added confirmatory evidence of the value of the berries for removing tape-worm (taenia) in children and adults. The fruits were given a place in the Indian and Colonial Addendum of the British Pharmacopoeia. The fruits are globular, dull-red, smaller than pepper corns, with a 5-partite calyx, and stalked. The outer shell is striated from base to apex, with a small beak. Inside it is reddish-brown marked by dark spots; the seed is horny with a reddish-brown crystalline efflorescence.

Dr. Warden in 1888 separated from the drug a crystalline active principle in golden spangles which he named embelic acid. Brissemoret in 1907 showed this substance to be an oxyquinone.

Erysimum repandum Linn. (Cruciferae). The seeds.

Tukhm-i-Khākshīr (Hamadan); Khakechi (Schl.); Khubah (Arab.); Kashir (Bal.).

Achundow; Ait.; Schl.; Boiss. i. 189; Fl. Br. Ind. i. 153; I.H.B.

This is a small annual herb, hoary with close appressed hairs. It is frequent in Kashmir, Persia and westwards to Europe and West Africa. The seeds, with those of *Sisymbrium Sophia*, *S. Irio*, and other cruciferous plants, are exported into India from Persia under the name of Khakshir. The seeds from Hamadan are small, oblong, 1 mm. long, reddish or yellowish-brown, smooth, shining (not dull like those of *S. Sophia*), one surface convex and the other grooved, ending in a depression. When placed in water they become coated with transparent mucilage. The kernel is yellowish and oily, and has the flavour of mustard. The seeds are given in fever, and externally, in the form of a poultice, they relieve pain in the stomach (C).

Ferula galbaniflua Boiss. (Umbelliferae). The oleo-gum-resin.

Biriz (Teheran); Barije, barzad (Pers.); Jao-shir (Arab.); Gum Galbanum.

Boiss. ii. 988; Schl. 295; Sino-Iranica, 363; Ait.; Ph. Ind. ii. 152.

Dr. Aitchison describes the Galbanum plant as being found in moist localities, as in the Badghis near Gulvan, where it grows in sandy soil. When in full blossom the flower is of a brilliant orange-yellow; as the fruit forms and ripens the colour changes, showing various autumnal tints. The stem is thick at the base, tapering suddenly and reaching a height of about four feet. The stem, on injury, yields an orange-yellow juice which slowly consolidates and has a strong odour resembling celery. This gum-resin is an article of export through Persia *via* the Gulf to Arabia and India. The sample from Teheran is said to have come from Kurdistan and Mazanderan. Galbanum is used internally for colic and is a useful stomachic. Externally it is applied as a plaster to sores and wounds. The drug contains resin 65, gum 20, essential oil 10–22 per cent., chiefly a terpene, d-pinene.

Ferula sp. (Umbelliferae). Oleo-gum-resin.

Sek-benedge (Teheran); Sagbinaj (Arab.); Iskabinah (Pers.); Sek biniedge (Schl.); Sagapenum.

Achundow; Ait.; Schl.; Sino-Iranica, 366; Ph. Ind. ii. 161.

Sagapenum is a fragrant gum-resin obtained from an undetermined plant in Laristan. Previous writers have suggested *Ferula persica* Schl. and *F. Szovitsiana* DC. as its botanical sources, but these have not been confirmed. The Makhzan-el-Adwiya states that the drug is brought from Shiraz and Kerman. As found in the market, the tears adhere into brownish-yellow cakes, translucent, with a persistent alliaceous odour and acrid taste. It yields by distillation a volatile oil containing sulphur. In the form of a plaster the drug has a local reputation for rheumatism.

Foeniculum vulgare Mill. (Umbelliferae). The fruits.

Razione (Teheran and Hamadan); Razianah (Pers.); Dadli boyana (Tabriz); Razianaj (Arab.); Shum razionj (Syr.); Fennel.

Post, 356; Schl.; Ph. Ind. ii. 124; On the commercial varieties of Fennel, J. C. Umney, Pharm. Journ. 58 (1897) 225; I.H.B.

Fennel is a stately umbelliferous plant cultivated for its fruits in several parts of Europe and Asia. The fruits are frequently in the bazaars confounded with aniseed (*Pimpinella Anisum* Linn.) the Persian name for which is Badian. A sample of fruit from Teheran labelled Badian, for instance, was that of Fennel. The fruits, commonly called seeds, are greyish-brown, slightly curved, beaked, with 5 prominent ridges on each mericarp, about 6–7 mm. long. The taste is sweet and aromatic. They yield from 3 to 5 per cent. of essential oil containing, as the principal ingredient, anethol, which constitutes 50 to 60 per cent., with a small amount of a compound with a bitter taste called fenchone. J. C. Umney found the odour of Persian fennel nearer to anise than any other variety of fruit examined, the percentage of anethol being higher and fenchone comparatively low. Fennel is a valuable condiment, and enters into mixtures given for dysentery and colds.

Fritillaria imperialis Linn. (Liliaceae). The corms.

Gul-i-samigun (Teheran); Gole-samagune, "The bulbs of the topsy-turvy"; "The tubers of a plant, the flowers of which, according to the natives, hang upside down, considered rare in Afghanistan and highly valued as a medicine" (Aitchison). Schlimmer refers the drug to *F. acmopetala*. Another Persian name for this plant is Gul-i-shirper, "flowers of six feathers" (L. J. Jefferies, mountains of Dasht Arjin, Farsistan. 1888).

Boiss. v. 189; Ph. Ind. iii. 498.

The Crown Imperial. The drug consists of broken pieces of thick corms. They are of a whitish colour, without odour or taste. The starch is oval and regular. An alkaloid has been separated from them by Fragner. The corms of species of *Fritillaria* are a valuable medicine in the Far East, chiefly for chest complaints. Regarding the Persian drug it is said, "When a woman has a child, a paste is made from it and is put on her stomach to reduce pain." (C).

Fumaria parviflora Lam. (Fumariaceae). The herb and fruits.

Shah tara (Teheran); Tukhm-i-Shahtara (Hamadan); Shah-tarra, "royal herb"; Tarra, "pot herb" (Pers.).

Achundow; Schl.; Boiss. i. 135; Fl. Br. Ind. i. 128; I.H.B.; Ph. Ind. i. 114.

The Fumitories are medicinal herbs employed throughout India, Afghanistan, and Baluchistan. The above species is found as a weed of cultivation, and the fruits are collected and exported.

The herb and fruits are both used in medicine. The herb occurs as broken fragments of stem and leaves with a slightly acid and

astringent taste. The fruits are green, globular, the size of a pin's head, apiculate, rugulose on the surface, and one-seeded. They have hardly any odour, and the taste is slightly acrid and astringent. The plant contains fumaric acid and the alkaloid fumarine. Shahrtara is highly esteemed by Mohammedans in India ; it is said to purify the blood and act as a laxative and diuretic. In Persia it is often mixed with chicory for medicinal purposes.

Gaillardia aristata Pursh. (Compositae). The fruits.

Ra'ana ziba (Teheran) ; Ra'ana (Arab.), Ziba (Pers.), both words meaning " beautiful."

This drug consists of the achenes of a North American plant grown in Persia for its handsome yellow and red flowers. The small villous achenes are surmounted by a ring of 6 to 10 hyaline pales, each 1-nerved, ending in a bristle. The plant is noticed by Mr. Gilliat-Smith as being cultivated in gardens near Tabriz, where the local name is Zilf-afshan.

Gul angrezi (" English-flowers ") and Gul ashrafi are the names of the dried flowers of *G. pulchella* Fouger, a plant introduced into Baluchistan (I.H.B.). The medicinal properties of these drugs are not stated.

Glycyrrhiza glabra Linn. (Leguminosae). The root.

Risha asra sus (Teheran) ; Sus, asus (Pers.), the plant ; Bekh-sus, the root-stock ; Rob-asus, asal alsus, the extract.

Achundow ; Ait. ; Boiss. ii. 202 ; Post, 277 ; Schl. ; Ph. Ind. i. 491.

Aitchison says the liquorice plant is a characteristic and extremely common shrub in the Badghis and Khorasan, at an altitude of above 2000 ft., and most luxuriant in loamy soil where there is moisture. In the latter localities the annual shoots grow to four feet with enormous underground rootstocks, which are sometimes used as fuel. The nomads collect these rootstocks from which they prepare the extract of liquorice. Post remarked that in Syria liquorice is a variable species in waste fields and on dry hill-sides, crowding out other vegetation. Schlimmer refers to three species, *G. glabra*, *G. echinata*, and *G. violacea*, while Boissier makes several varieties of the plant. It occurs also in Baluchistan. India obtains market supplies from Persia and Sind, and Aitchison suggested its cultivation in Quetta, Kohat, Peshawar, and other localities on the North-western Frontier. Throughout Asia liquorice root and its extract from time immemorial has been used for cough and chest complaints. In northern Persia the fibre of the root left after the preparation of the extract has been known to be made into paper.

Gypsophila paniculata Linn. (Caryophyllaceae). The root.

Zuleh (Hamadan) ; El-sabuniyeh, of the Arabs ; Saosafed, Bekh (Ait.) ; Kundur, Kundusch (Achundow) ; Soap root.

Aitchison ; Post ; Boiss. i. 542 ; Ph. Ind. i. 155.

A shrubby plant of North Persia, Afghanistan, the Caucasus and Turkestan, 3 to 4 feet high with numerous stems springing from a perennial root-stock. The plants are characteristic of sandy soil ; in Khorasan they are wild in cultivated ground. The underground root-stocks are collected and used as soap for washing the hair and clothes. In Persia the roots are regarded as poisonous. They contain the glucoside saponin ; Kobert in 1904 separated from 6 to 16 per cent. of this principle from various samples of soap root. The Persian drug is no doubt a substitute for the older Roman and Egyptian *Struthium*, the root of *G. Struthium* Linn. of S. Europe. According to Achundow some of the vernacular names may refer to other saponin-yielding plants. *G. Arrostii* Guss. is the origin of the Levantic soap root.

Helicteres Isora Linn. (Sterculiaceae). The fruits.

Pachman-i-puh (Teheran) ; Kisht bar Kisht (Pers.) ; Pechak (Hind.) ; Avartin (Sans.) ; the Persian and Sanskrit names signify the furrows on a ploughed field.

Ibn Baitar ; Achundow ; Fl. Br. Ind. i. 365 ; Ph. Ind. i. 231.

The East-Indian Screw tree occurs in the dry forests throughout Central and Western India, and in Ceylon, and is found also in Java and northern Australia.

The spirally curved fruits are sold in all Indian bazaars, and their medicinal reputation is evidently known in more northern countries. The fruit is composed of fine slender, angular carpels twisted like corkscrews, and together forming a cone 3.5 to 5 cm. long. The carpels are pubescent and greenish-brown, and each one contains a single row of dark-brown, angular seeds. The drug has demulcent and slightly astringent properties, and is employed as a medicine for dysentery, for griping of the bowels, for flatulence in children, and for improving the appetite.

Heracleum persicum Desf. (Umbelliferae). The fruits.

Goleper (Kermanshah) ; Giafari (Schl.).

Schl. ; Post ; Boiss. ii. 1044.

This species of cow parsnip is indigenous in the moist valleys of the Elburz mountains, and is related to *H. pubescens* M.B., of a wider range. Boissier refers the plant Goulpere to *H. lasiopetalum*. The fruits, which are sold as a spice, are ovate-oblong, villous on the back, margin aculeate, the dorsal vittae thick and clavate, extending to two-thirds the length of the mericarp. While some of these plants are used medicinally and for food, other species in America and Europe are poisonous and produce erysipelatos inflammation (Cormerin, Des Plantes Vénéneuses, 1887).

Holarrhena antidysenterica Wall. (*Wrightia antidysenterica* Grah.). (Apocynaceae). The seeds.

Tukhm-zaban-i-gungishk-i-talk, "seeds of the bitter sparrow's tongue" (Pers.) ; Lizan ul asafir (Achundow) ; Indrajau (Hind.) ; Estrefanthus.

Ph. Ind. ii. 392 ; Pyman, Journ. Chem. Soc. 1919 ; Fl. Br. Ind. iii. 645.

A small deciduous tree in the tropical Himalaya, ascending to 3500 ft., from the Chenab westwards ; throughout the drier forests of India, to Travancore and Malacca.

Samples of the seeds came from the bazaars of Hamadan and Teheran, showing that this Indian drug is well established in Persia. The seeds are narrowly linear-oblong, glabrous and brown, about 1.2 cm. long. They have a bitter taste due to the presence of an alkaloid, wrightine (conessine), which resides also in the bark of the tree, and may be separated in white crystals. Conessine acts like emetine. The seeds are reputed to have tonic and aphrodisiac properties.

Hyoscyamus reticulatus Linn. (Solanaceae). The seeds.

Bazr-el-banj (Hamadan) ; Bezor ol bendge (Schl.) ; Kohi bang (Bal.) ; Benj (Arab.) ; Bango (Port.) ; Henbane seeds.

Ait. ; Boiss. iv. 295 ; Schl. ; Post ; Ph. Ind. ii. 626.

This species of *Hyoscyamus*, as well as *H. muticus* Linn. and *H. pusillus* Linn., is found wild in Persia and Syria. Aitchison observed that goats and sheep grazed on Henbane plants without apparent bad effects, and the shepherds did not look upon these herbs as poisonous. The seeds of these plants are, however, regarded by native physicians as being as poisonous as opium ; they are exported from Persia to India. Henbane seeds are reniform, laterally compressed, greyish-brown in colour, with the testa finely reticulated. The taste is oily, bitter, and acrid.

The seeds and leaves contain the poisonous alkaloid hyoscyamine, the effect of which is to produce vertigo and insanity. The smoke of the seeds is inhaled for toothache.

Illicium verum Hook. f. (Magnoliaceae). Fruits.

Bādiān-i-khtai, " Anise of China " (Pers.) ; from Teheran.

Schl. ; Ph. Ind. i. 41.

The Star Anise of commerce is obtained from trees growing in South China and Cochin-China. South-east Kwangsi and Tonkin possess the world's monopoly of this product, and Hong Kong is the chief distributing medium for foreign countries. Star Anise was a new medicine in Persia a hundred years ago, but the fruits and oils are now shipped regularly to India from China, and reach Persia via Bombay. The star-shaped fruits, composed of eight brown, radiating, boat-shaped carpels, vary from 3 to 3.5 cm. in diameter. They contain about 5 per cent. of essential oil, consisting of solid and liquid anethol ; from 85 to 90 per cent. of anethol can be obtained from good oils by the freezing method. The fruits and oil are stomachic and are given to relieve cough and lung affections, and are used in confectionery and for seasoning food.

Inula Helenium *Linn.* (Compositae). The root.

Ghaza gouzanah (Teheran); Anduz (Hamadan); Gharsa; Pil gush, "Elephant's ear"; Rasan; Rasna of the Hindus; Andiz otu (Turki, *vide* Boissier ii. 186); Zendjebile chami, "ginger of Damos"; Zanjabil-i-shami, "Syrian Costus"; Aunée (Fr.); Helenion (Gr.); *Enula campana* (Med. Lat.); *Elecampane*.

Ph. Pers.; Schl.; Boiss.; *Pharmacographia* 340; Ph. Ind. ii. 259.

This plant is distributed in Central Asia and Central and Southern Europe. Schlimmer says the root sold in Persia comes from Baghdad and Damascus.

Elecampane root was an ancient medicine among the Greeks and its use spread to other parts of Europe and to Asia. It is not only an Asiatic drug but it is also recognised in the *Pharmacopoeias* of Germany, France, and the United States.

The root is hard and horny, brownish-grey in colour, paler within. The bark and wood are separated by a dark cambium layer; shining brown oil glands appear scattered over the surface of a transverse section, or are arranged in radiating groups. Crystals are seen in the interstices of old commercial samples. The root has an agreeable aromatic odour and a warm bitterish taste. In addition to inulin, which so frequently displaces starch in the *Compositae*, *elecampane* root contains from 1 to 3 per cent. of a solid crystalline mass permeated with a liquid oil containing alantic acid and alanto-lactone.

The root is given for bronchitis and tuberculosis and is a general aromatic tonic. It is used locally to reduce eruptions. From early times *elecampane* has been used as a substitute for or adulterant of the *Costus* of the East. Dymock mentions *I. Royleana* DC. and *I. racemosa* Hook. f. as plants affording roots for mixing with *Costus* in more recent times.

Ipomoea hederacea *Jacq.* (Convolvulaceae). The seeds.

Habb-el-nīl (Hamadan); Hab-un-nīl (Arab.); Hebbonile (Schl.); Tukhm-i-nīl (Pers.); Tukhm-i-nīlafar (Afgh.); Kaladanah (Hind.); *Ipomoeae cyanosae semina* (old Herbals); *Pharbitis* seeds.

Ait.; Schl.; Fl. Br. Ind. iv. 197; Ph. Ind. ii. 532; B. P. 1914.

The above plant grows all over India. The flowers are blue, hence the name *nilafar*.

The seeds are blackish, forming the quadrant of a sphere, about 5 mm. long, with a minute protuberance at the upper end; they have a longitudinal dorsal groove, and dark-brown hairs on the hilar depression. These characters distinguish the seeds of this species from those of *I. muricata* *Jacq.* which are also used as a source of this drug. (Kassner, *Pharm. Journ.* 1924, [4] 58. 155, 203).

The action of these seeds is cathartic, due to the presence of an acrid resin. They are locally considered very poisonous.

Iris spuria var. **halophila** *Pall.*, and other species. (Iridaceae). The rhizome.

Risha-i-irisa (Teheran); Bikh-i-banafshah, "Violet root" (Pers.); Susan mund (Kash.); *Irisa* (Ind. bazaars); the name is a corruption of the Greek; Orris root.

Schl.; Boiss. v. 126; Ph. Ind. iii. 451; I.H.B.

The violet odour of Orris root has long been recognised in the East, and the root is accordingly used for its perfume and as a medicine. The rhizomes of different species vary in their activity and aroma. Aitchison says the rhizome of an *Iris* is called Orisa or Orisia in Afghanistan and is brought from Bijnort to the Meshed market. Bombay is supplied with Orris root from Persia and Kashmir. Dymock identified one source as *I. germanica* Linn. Three samples are in the collection from Persia, and the one from Hamadan agrees with the root of botanical specimens of *I. spuria* found in Kurdistan. In Baluchistan the rhizomes of *I. songarica* Schrenk, called Gharwasha, powdered with curds, are used to stop diarrhoea. *I. Stocksii* Hemsl. & Lace is eaten in the Quetta Valley. The roots sold in the Persian bazaar retain their outer peel and differ from the trimmed root sold in Europe. Irises are plentiful in Persia, and their roots might be profitably exploited for the home markets. The roots yield a glucoside, iridin, and an ethereal oil containing irisol.

Juniperus communis *Linn.* (Taxaceae). The fruits.

Habb-el-harār (Teheran); Hab-el-a'ra'r (Ind. bazaars); Er'er, djerdjere (Schl.); Juniper berries.

Ph. Pers.; Abu Mansur; Ph. Ind. iii. 371; B.P. 1914.

The Juniper fruits sold in Teheran are said to be collected in the Elburz mountains. The fruit is a galbulus, grey-brown, 8 mm. in diameter, apex with a triradiate scar; it contains three hard, triangular seeds with large oil-glands and yellowish resin. The odour is like turpentine and the taste sweetish.

The fruits are a well-known drug in India, where they are imported from the west. The essential oil is official in the British Pharmacopoeia. The fruits and oil have a diuretic action and are administered for dysmenorrhoea.

Lallemantia Royleana *Benth.* (Labiatae). The seeds.

Balingan (Hamadan); Tukhm-i-balung (Ind.); Tukhme balengon; Dracocephali Royleani semina (Schl.).

Boiss. iv. 674; Ph. Ind. iii. 90.

This plant is found throughout Persia, Baluchistan, Afghanistan, Turkestan, and Northern India.

The seeds are black, narrowly oblong, 3 by 1 mm., smooth, angled on the inner side, arched on the other, a white spot at the narrow end or umbilicus. When soaked in water they become coated with an opaque, grey, tasteless mucilage.

The seeds are used for cough, and as a cordial stimulant and aphrodisiac.

A similar drug, the seeds of *L. iberica* F. & M., is sold in the bazaars at Tabriz, where the seeds are called Gara za'arak, meaning "little black seed." The plant is a pot herb (Gilliat-Smith).

Linguas officinarum *Burkill* (*Alpinia officinarum* Hance). (Zingiberaceae). The rhizome.

Kulenan (Teheran); Gölindjān, Khulanjan (Pers.); Lesser Galangal.

Schl. ; Ph. Ind. iii. 437 ; Hanb. Sci. Papers, 370.

This plant is indigenous to the Chinese island of Hainan, and is cultivated on the neighbouring coast of Kwangtung and in Siam. The rhizome is an ancient spice and medicine of the East and is occasionally brought to European countries. The drug is exported from Hong Kong and the Straits Settlements to Calcutta and Bombay, and re-exported to Arabia, Persia and Egypt.

The root is about 5 cm. long and less than 1.3 cm. in diameter, often branching, externally of a rusty-brown colour, longitudinally striated, and transversely marked with remains of leaf sheaths. Internally it is greyish-brown and breaks with a fibrous fracture ; the odour is aromatic and the taste hot and spicy.

It yields from 0.5 to 1 per cent. of essential oil, containing cineol, to which the oil owes its camphor-like odour, eugenol, d-a-pinene, and probably cadinene (Gildmeister & Hoffmann ii. 278). Galangal root is used as a condiment, and in medicine it is given as a stomachic and for rheumatism.

Lavandula dentata *Linn.* (Labiatae). Flower-heads.

Astukudos (Teheran); Ustukhudos (Pers.); Osthoukhodouce (Schl.) ; The Persian name is derived from the Greek.

See paper on this drug by Mr. I. H. Burkill in the Journ. As. Soc. Bengal, N.S., Vol. v. No. 3, March, 1909, 67-71 ; Ph. Ind. iii. 93 ; Boiss. iv. 540.

These are the flower-heads of a species of Lavender sold in Teheran and brought from Shiraz. They constitute an ancient drug used by the Greeks and referred to by Arabian and Persian physicians. The name ustukhudos has been applied to *L. Stoechas* L., the Staechus of old works on Materia Medica, the Lavender of the Isle of Hyères. *L. Stoechas* of the Mediterranean region has purple flowers on short, stalked spikes, with downy heart-shaped bracts. Upper bracts form an abortive purple tuft at the top, and the herb has a camphoraceous odour and hot bitter taste. *L. dentata* has the odour of rosemary and camphor. The essential oil contains dextro-camphor and dextro-fenchone, and probably fenchyl alcohol. (Giessler, 1915). Oil of *L. dentata* is similar to that of *L. Stoechas* (Gildmeister & Hoffmann iii. 450).

An infusion is given for catarrh. Locally the drug is outwardly applied in cases of neuralgia, to check bleeding, for the washing of wounds, and as a remedy against eruptions.

Lecanora esculenta *Eversm.* (Parmeliaceae). The lichen.

Shir zad (Teheran) ; Chir zadi, Agalactie (Schl.).

Holmes, Manna, Chem. & Drugg. xcii. 25 (1920).

The manna lichen is abundant in North Africa and Western Asia, on rocks or on soil, and locally in the desert of Seistan. It varies from the size of a pea to a small nut, clear brown or whitish, the interior is soft, white with interlacing hyphae and crystals of calcium oxalate. There is a tendency for the thallus to develop excrescences of a nodular form which easily become free and drift about by the wind in the desert. Under the article "Agalactie" Schlimmer records historic references to this lichen being used as food from the time of Alexander the Great. According to La Cour (1880) and Elekin (1901), the lichen contains lichenin, but its nutritive value is very low. The name of the drug means "milk begetting," and it is used in Teheran to increase the flow of human milk after childbirth.

Lepidium sativum *Linn.* (Cruciferae). The seeds.

Tukhm-shahi (Teheran) ; Tereh tizec (Schl.) ; Assalia (Bomb.) ; Tara tezak (Afg.) ; Cress seed.

Ait. ; Schl. ; Ph. Ind. i. 120 ; Boiss. i. 354.

The cress or garden cress is a native of Persia and is widely distributed as a cultivated plant eastwards to Tibet. The seeds are exported as a drug from Persia to India and westwards to Europe. The seeds are light brown or reddish-brown, oblong, 3 by 1.2 mm., with a depression on the inner margin and a white spot at one end, cotyledons incumbent. They have a pungent cress-like taste and become coated with transparent mucilage when soaked in water. The seeds contain 50 to 60 per cent. of fatty oil. Myrosin, an enzyme, with water, yields a volatile oil. Phenyl acetic acid, nitrile or benzyl cyanide is the principal constituent of the essential oil (A. W. Hoffmann). The seeds are tonic, aphrodisiac and diuretic.

Lepidium Draba *Linn.* (Cruciferae). The seeds.

The Hoary Cress, a weed of cultivation, distributed westwards to Europe, is the Montchih of Ispahan ; Bajindak (Hind.) ; Buski seed of Baluchistan (I.H.B.). In Tabriz the young shoots are used as a salad under the name of "Khili-wili."

The seeds are smaller than those of the previous species, oval and dark brown. Seven or eight seeds are given as a dose for flatulence.

Linum album *Kotschy.* (Linaceae). Stems and flowers.

Sodabe (Hamadan) ; White Linseed.

Boiss. i. 858.

This is a glaucous shrub in Persia growing among crops. The lower parts of the stems are white and leafless. These stems and a few flowers form a drug which is used for syphilis, but the remedy is not recorded in other medicinal works of the East.

Linum usitatissimum Linn. (Linaceae). The seeds.

Basarak (Hamadan); Basarak katon, "Little seed of flax" (Pers.); Tukhm-i-katan (Ait.); Bazr ul kattan (Ach.); Bizre kattane (Schl.); the names for linseed in India are Alsī, Atasi and Alashi.

Ph. Ind. i. 239.

Aitchison informs us that in Afghanistan the Flax plant and seed are known as zagher; the oil of the seed as roghan-i-zagher; the fibre and linen cloth as katan or katon. The plant is cultivated in Turkestan for its seed for oil, but here, as in India, the fibre is not collected.

The seeds are largely eaten in sweetmeats, and the oil is employed both as a burning oil and in diet. In India the seeds are crushed and used as in Europe for poultices, and the oil is exported in large quantities from Calcutta.

Malva sylvestris Linn., var. **mauritiana** Boiss. (Malvaceae). Flowers.

Panirak (Teheran); the name in Persian means "little cheese," from the shape of the fruit; Penirek, Khib-bazi (Schl.); Nan-i-kulagh, "Crow's beard"; Khitmi-i-kuchak, "Small khitmi" (Pers.); Hamam komandji (Turki).

Boiss. i. 819; Ph. Ind. i. 204.

Aitchison says the flowers of the Mallow (*M. sylvestris*), called Gul-i-khatmi, are collected and exported and employed in medicine in North-eastern Persia. Dymock remarks that three varieties of the plant are grown in India: (1) cultivated, molochia; (2) large wild, khitmi; (3) small wild, khubazi. Khubazi is the Arabic and Bombay name of the drug imported into India from Persia. The drug from Teheran consists of the flowers with the small rotate carpels of the fruit ("little cheeses") in an immature state. Khatmi or khitmi is usually applied to the larger-flowered plants of species of *Althaea*. The Teheran drug is used locally for whooping cough (C).

Merendera persica Boiss. & Kotschy. (Liliaceae). The corms.

Surinja (Hamadan); Surinjan, shambalit (Pers.); Colchicum Persicum (Ph. Pers.); Sourenjane metri (Schl.).

Ph. Pers.; Boiss. v. 167; Schl.; Ait.; Ph. Ind. iii. 496.

This plant, allied to the *Colchicum*, occurs in North Persia, Afghanistan, the Juniper tracts of Baluchistan, and in the Punjab.

Aitchison found the plant common all over the Badghis and Khorasan. The corms are collected and exported from Meshed, as a medicine, through Persia to India *via* the Persian Gulf. The drug is one of the forms of the ancient Hermodactyl. It is probably the Surinjan-i-shirin or Sweet Surinjan, a medicine used by the Mohammedans in India.

The root from Hamadan is broken up into pieces showing a white, starchy fracture with no perceptible taste or smell. The starch granules are oval or rounded, occasionally truncate, with a hilum.

The drug is said to have the same action as the bitter Surinjan (*Colchicum* spp.) as a remedy for rheumatism.

Morus nigra Linn. (Moraceae). The root-bark.

Risha sha tut (Teheran); Chah touti (Schl.); Shah tut, "Royal Mulberry"; Tut shami (Syr.); Moron (Gr.); Sycamine.

The Black or Grafted Mulberry is cultivated in Persia and Baluchistan, principally for its fruit; the White Mulberry (*M. alba*) is grown for sericulture. They both yield fruit which in season is sold in the bazaars and met with in nearly every household (Aitchison).

The drug from Teheran consists of the bark of the root, reddish-coloured externally, with strong silky-white liber cells. It is used for dysmenorrhoea. In China the root-bark of the White Mulberry also has a great reputation as a medicine.

Nepeta isphahanica Boiss. (Labiatae). Flowers.

Zūfā (Teheran); Zufah-i-yabis (Pers.).

Boiss. iv. 166; Achundow; Ph. Ind. iii. 116.

Zufah is a fragrant plant used for many years as a drug in the East. Schlimmer refers to Zoufa as a Hyssop and identifies the plant as *Nepeta officinalis*. Aitchison doubtfully refers the Zufa of Afghanistan to a species of *Hyssopus*. Dr. Dymock found the Zufah in Sind to be *N. ciliaris* Benth., while the plant of this name in Baluchistan is *N. bracteata* Benth. (I.H.B.).

The drug from Teheran consists of the fruiting calyx and seeds and stalks of *N. isphahanica*, a species allied to *N. schiraziana* Boiss. The calyx is erect, 5 mm. long, 15-ribbed, green, with purplish, lanceolate, acute teeth, nearly as long as the tube. The seeds are oblong, 1 mm. in length, minutely punctate, with a white V-shaped scar at the narrow end. The seeds are mucilaginous when placed in water.

Nigella sativa Sibthorp (Ranunculaceae). The seeds.

Siyah danah, Shuniz (Pers.); Hab-es-souda (Arab.); Kala jira (Hind.); Siah daneh, Chounige (Schl.); False Cummin.

Boiss. i. 68; Ph. Ind. i. 28.

An annual herb, sometimes called the Nutmeg flower or Fennel flower, cultivated in Egypt, Syria, and Persia. According to Birdwood the seeds of the plant are the Black Cummin of the Bible, the Melanthion of Hippocrates and Dioscorides, and the Gith of Pliny.

The seeds are triangular, 2.5 to 3 mm. long, the umbilical end being the smaller, black; the testa is rough, with a white, oily kernel within. When crushed there is a pleasant odour of lemon. The seeds have been analysed by H. G. Greenish (Pharm. Journ. [3] x. 909), who found an essential oil, a fixed oil, and a saponin-like body. The seeds are used extensively as a spice and medicine. The ancient custom of sprinkling the seeds, like those of cummin, over the surface of bread baked by Mohammedans still prevails in Teheran and Tabriz. There is an Arab proverb: "In the black seed is the medicine for every disease except death." Around

Tabriz *N. arvensis* Linn. is cultivated as a pot-herb and for its seeds. It is called Gara tschorek oti, "Black bread weed" (Gilliat-Smith).

Nymphaea alba Linn. (Nymphaeaceae). The flowers.

Nilafar (Teheran); Nilufar (Pers.); Nenufar (Ph. Pers.).

Ait.; Boiss. i. 104; Fl. Br. Ind. i. 114; Ph. Ind. i. 70.

These are the flowers of the White Water Lily found in ponds throughout Europe and Siberia. Nilufar is a name also applied to flowers of other water-lilies and sometimes to species of *Ipomoea*, which have blue flowers. Kamal, the flowers of a *Nymphaea*, is sold in drug-shops in India; and occasionally the flowers of the Sacred or Egyptian Lotus (*Nelumbium speciosum* Linn.) are used medicinally, especially in China.

The flowers have cooling and astringent properties and are administered locally for fevers and chest troubles (C).

Ochrocarpus longifolius Benth. & Hook. (Guttiferae). The buds.

Normush (Hamadan); Tambra, "red," Nagkeshur (Pers.).

Fl. Br. Ind. i. 270; Ph. Ind. i. 172.

This tree grows in the western part of the Peninsula of India from Canara to the Concan. The flower buds come principally from Rajapur and the Deccan.

The reddish-brown globose flower buds, like cloves, are used for dyeing silk and are astringent. In Persia, where they seem to have been recently introduced, they are used as a tonic (C).

Ocimum Basilicum Linn. (Labiatae). The seeds.

Tukhm-i-raihan (Hamadan); Reyhane sibze (Schl.); Takmeria (Bomb.); Semen Basilici (Old Herbals); Alfabaca (Port.).

Ait.; Boiss. iv. 534; Fl. Br. Ind. iv.; Ph. Ind. iii. 83.

The Sweet, Roman, or Garden Basil is a native of India and Persia and is distributed in Africa and Malaya. Raihan is Arabic for "the herb," and the plant is a pot-herb much used for its mint-like aroma. The seeds have long been known in medicine, and are said to be the Badranj of Ibn Sina. Large quantities are imported into India from Persia.

The nutlets or seeds are blackish, oblong, 2 to 2.5 mm. long by 1 to 1.2 mm. broad, punctulate, slightly arched on one side, with a white umbilicus at the end. They immediately become coated with a semi-opaque mucilage when placed in water.

Schlimmer remarks that the seeds are eaten with bread and cheese.

Ocimum canum Sims (*O. album* Roxb.). (Labiatae). The seeds.

Tukhm-i-sherbati (Hamadan); Tukhm-chirbati, reyhane kouhi, Badroudge ibieze (Schl.); White Basil.

Schlimmer remarks that Shiraz supplies Persia with these seeds, and adds that they are an indispensable ingredient in iced sherbert (sorbets à la glacé). It is said that when placed in water they give

off an agreeable odour, thus differing from the seeds of species of plantain (*Plantago*).

The seeds or nuts are black, punctulate, oblong or ellipsoid, 2 by 1 mm., arched on one side with a sharp bifurcate line on the other. They are smaller than those of *O. Basilicum*, with a less prominent white umbilicus, but, like them, they become coated with opalescent mucilage when placed in water.

The seeds are given locally for lung and chest complaints.

Onosma echioides Linn. (Boraginaceae). The root.

Risha hava chuba (Hamadan); Haveh tchoubeh (Schl.); Harjuya (Pers.); Ratanjot (Hind.); Yarleng (Bal.).

Achundow; Schl.; Boiss. iv. 181; Fl. Br. Ind. iv. 178; I.H.B.; Ph. Ind. ii. 54.

This plant, growing in Afghanistan and Siberia, affords a root which is a substitute for Alkanet (*Anchusa tinctoria*), from Al-kanna of the Arabs, employed as a dye and medicine in early times. The root of the allied species, *O. Hookeri* Clarke, is called Ranj-i-badshah, "King's dye." The tapering root has a purplish-red colour, and the cortical portion is easily separated in flakes. It imparts its colour to oils and spirits, and is used in colouring medicinal preparations. In Baluchistan the powdered leaves are given as a purgative to children. In Hamadan the root is powdered and given to horses for cough.

Papaver somniferum Linn. (Papaveraceae). The seeds.

Tukhm-i-khash-khash (Hamadan); Khish khash (Arab.); Kheche-kheche (Schl.); Poppy seeds.

Aitchison; Post; Ph. Ind. i. 73.

The seeds of the Opium Poppy are eaten in sweetmeats. They contain 50 per cent. of drying oil which is sometimes expressed and called Roghan-i-khash-khash. This oil is used for burning as well as for food. The seeds are sometimes said to be poisonous because they are contained in the opium-yielding capsule, but they are wholesome and nutritious.

Peganum Harmala Linn. (Rutaceae). The seeds.

Harmall (Arab.); Ispand, sipand (Pers.); Uzarih (Turki); Kharjil, haremlan (Syr.); Espende, sodabe kouhi (Schl.); the Syrian Rue.

Achundow; Schl.; Post; Boiss. i. 917; Fl. Br. Ind. i. 486; Ph. Ind. i. 75; Wiesner, 44.

The Mountain Rue is a plant of Persia, Arabia, Syria, North Africa, and South Europe. The plant and seeds were used medicinally by the Greeks and Romans. Harmel or wild rue, a native of Eastern countries, was noticed in European Herbals in the XVIIth century. The seeds are imported from Persia into India, where the plant has been introduced by the Mohammedans. The seeds are dull grey-brown, 2 mm. long, irregularly angular, testa spongy and rough, albumen fleshy, embryo curved; they have a bitter taste,

and when crushed have a heavy narcotic odour. They afford a fluorescent solution in water and a red-coloured tincture in spirit. The active principle probably resides in the alkaloids harmaline (Göbel, 1837) and harmine (Fritzsche, 1847). The custom still prevails in Persia of sprinkling the seeds on burning coals at marriages to avert the malignant influence of the evil eye. The seeds are an alterative and purifying medicine, and are supposed to stimulate the sexual system.

Physalis Alkekengi Linn. (Solanaceae). The fruits.

Gul-i-kakandj (Hamadan); Kakanah (Pers.); Kekenadge (Schl.); Alkikenji (Arab.); Clammy Wintercherry.

Achundow; Boiss. iv. 287; Post; Ait.; Schl.; Ph. Pers.; Ph. Ind. ii. 560.

A plant of Syria, Arabia, Persia, and Baluchistan.

The berries of this plant are in shape and size like dried cherries, but are full of pulp in which are embedded many reniform, yellowish seeds. As sold in the bazaars, broken fragments of the red accrescent calyces are mixed with the drug.

The fruits are said by Schlimmer to be hydragogue and vermifuge. Achundow indicates their use in certain female complaints. Locally they are regarded as a remedy for syphilis, and are supposed to be intoxicating when taken in quantity (C).

Pimpinella Anisum Linn. (Umbelliferae). The fruits.

Bāadian-i-rūmī (Teheran); Antchibun, a corruption of Anisum (Tabriz); Erva dos, from Portuguese *Herba doce* (Dymock); Aniseed.

Ait.; Boiss. ii. 866; Schl.; Ph. Ind. i. 131.

Anise is cultivated largely in Russia, as well as in Persia, for its seed, which is employed as a condiment and medicine. The fruit is often confounded with fennel. Boissier and Pomet give the Arabic Badyan as the vernacular name of *Foeniculum officinale* All. and the sample from Hamadan, labelled Badian, is the fruit of *Foeniculum vulgare*. Aniseed has been introduced into India from Persia, whence the supply for the Bombay market still comes. It is mainly a Mohammedan medicine, and is given in cough mixtures and to relieve pain. Arak-badiane or Anise water prepared by distillation is mentioned by Schlimmer. In Teheran the seeds are regarded as slightly poisonous. The active principle resides in an essential oil consisting of 80 to 90 per cent. of solid anethol which separates out slightly below ordinary temperatures, and anisic methylv charvicol.

Pistacia Khinjuk Stocks. (Anacardiaceae). The galls.

Buzghanj (Hamadan); Ushgai, bazgai (Bal.); Gul-i-pista (Bom.); Kakra-singh; Afs or Afs-el-batum (Tripoli).

Ait.; Boiss. ii. 6; I.H.B.; Ph. Ind. i. 377.

This is a frequent tree in Persia, Baluchistan, and Afghanistan, and has been described under different species. The tree yields a

resin-like material, and the nuts, which are eaten, afford a sweet oil ; the leaves and galls are employed for tanning.

The galls are formed by an insect *Pemphigus utricularius* Pass. (figured in "Les Zoécécidies des Plantes d'Afrique, d'Asie et d'Océanie," by C. Houard, 1923, figs. 1010-1012, p. 471, under *P. atlantica* No. 1731). The galls, which contain about 40 per cent. of gallotannic acid, are ovoid, larger than peas, sometimes fig-shaped, at first pink in colour turning grey ; the wall is thin, brittle, rugose on the outside, smooth within, translucent. The taste is astringent and slightly terebinthinate. In Persian and Arabic works on medicine these galls are described as cold, dry and astringent. Besides the galls of the Khinjuk tree the fruits of various species of *Pistacia* are used as food. Laufer in Sino-Iranica remarks that these indigenous trees from ancient times have occupied a prominent place in the life of the Iranians. The youth of Persia have been taught to subsist on terebinths, and "terebinth eaters" became a nick-name. The seeds of the Pistachio nut tree (*P. vera* Linn.) are probably the terebinths referred to, but other species and varieties also afford edible fruits.

In the present collection two samples of fruits are included.

Sample one : Habul-kazra (Teheran), Habb-el-khazra (Pers.). Schlimmer identifies Hebbil el Khezra as the seeds of the Persian Turpentine tree (*P. acuminata* Boiss. ex Buhse, now a synonym of *P. Khinjuk* Stocks). These small seed-like fruits are oval in shape, 6 mm. long, reddish-brown in colour, with an acid taste and terebinthinate odour. They resemble fruits on botanical specimens of *P. mutica* F. & M., a tree of Egypt, Asia Minor, Persia, and Afghanistan. The fruits are eaten, and are said to be good for debility.

The second specimen, from Hamadan, is called Chaltangach (Chatlanguch). These are small drupes, broader than long, 5 by 6 mm., rounder than the previous sample, glabrous, rugose, grey with bony stone. They resemble the fruits of *P. integerrima* Stew. (Fl. Br. Ind. ii. 13), the North-western Himalayan form of the Turpentine tree. They have a marked terebinthinate odour. They are used locally to impart flavour to milk.

In Baluchistan, the fruits, "Shahna," of the Khinjuk tree are dried and made into flour and eaten by the poor (I.H.B.).

Plantago major Linn. (Plantaginaceae). The seeds.

Bareng (Teheran) ; Tukhm-bārhang (Hamadan) ; Bartang, barhang (Afgh.) ; Bar-i-tang (Bal.).

Achundow ; Ait. ; Schl. ; Boiss. iv. 878 ; Post 668 ; Ph. Ind. iii. 128 ; I.H.B. ; Gilliat-Smith.

The Greater Plantain is very widely distributed in temperate countries. The seeds of this and other species are largely employed in medicine in the East. In Tabriz this plant is called in Turki Bizousha dishi, the female kind. *P. lanceolata* L. is distinguished as Bizousha erkek, the male kind.

The seeds are small, oval, 1 mm. long by 0.5 mm. broad, smooth and brown. They throw off a transparent mucilaginous coating when placed in water.

On account of their mucilaginous properties the seeds have a great reputation for affections of the bowels and as a remedy for dysentery. They are used locally as a chest medicine (C).

The seeds of *P. Loefflingii* Linn. are sold in the bazaars in Tabriz, where they are called in Turki Karni Yarikh, meaning "healing of the stomach" (Gilliat-Smith).

Plantago ovata Forsk. (*P. Ispaghula* Roxb.). (Plantaginaceae). The seeds.

Asbarg (Teheran); Asparse, asbaghul, ispaghul (Pers.); Lisan ul hamal (Arab.); Psyllii semina (Ph. Pers.); Khardanick (Bal.).

Achundow; Schl.; Boiss. iv. 855; I.H.B.; Ph. Ind. iii. 126; Brit. Phar. 1914.

This species of Plantain is a native of Persia, Baluchistan, and Northern India. Stocks observed that it was specially grown in Sind for its mucilaginous seeds, which from the time of Dioscorides have been a well-known medicine in the East. Large quantities are imported into Bombay from Persia. These seeds are light-coloured, boat-shaped, pointed at both ends, 2 mm. in length, translucent, with a pinkish tinge and brown streak on the convex side; the concavity is covered with a thin white membrane. They become coated with mucilage when soaked in water.

An infusion of the seeds is given to quench thirst and relieve cough. The crushed seeds, made into a poultice with vinegar and oil, are applied to gouty and rheumatic swellings.

In Baluchistan the seeds of *P. ciliata* Desf. are also called Isbaghol, and are used as a cure for dysentery (Hughes-Buller).

Plumbago sp. (?). (Plumbaginaceae). The root.

Risha tamesh (Teheran); Shitaraj, Chitrak (Hind.).

This root is not identified with certainty, but agrees outwardly with museum samples of plumbago root, of which two kinds are known in the East; Indian and Syrian. The root is $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter, dark reddish-brown, longitudinally striated, and marked here and there by warty projections. The taste is acrid and biting. Its medicinal uses in Persia are not specified, but in India it is considered a powerful sudorific.

Poisons.

The following are regarded in Persia as poisonous drugs.

Aristolochia longa	Root	(Teheran).
Croton Tiglium	Seeds	(Hamadan).
Datura Stramonium	Seeds	(Hamadan & Teheran).
Datura Stramonium	Leaves	(Hamadan).
Doronicum Pardalianches	Root	(Hamadan).
Gypsophila paniculata	Root	(Hamadan).
Hyoscyamus reticulatus	Seeds	(Hamadan).

<i>Ipomoea hederacea</i>	Seeds	(Hamadan).
<i>Iris spuria</i>	Rhizome	(Hamadan).
<i>Onosma echioides</i>	Root	(Hamadan).
<i>Ricinus communis</i>	Seeds	(Hamadan).
<i>Strychnos Nux-vomica</i>	Seeds	(Teheran).
<i>Veratrum album</i> L.	Rhizome	(Hamadan).
<i>Withania somnifera</i>	Root	(Hamadan).

Polygonum sp. (Polygonaceae). The rhizome.

Risha-anjubar (Teheran); Anjubar-i-rumi (Pers.); Endjebbar (Schl.); Bistort is the Anjubar of the Western Arabs.

Ait.; Post; Schl.; Boiss. iv. 1027; Ph. Ind. iii. 150.

The rhizome sent under this name is nearly cylindrical, about 15 mm. thick, twisted, with rootlets below and scars above, reddish-brown and wrinkled on the outside, whitish within, with a ring of vascular bundles between the centre and circumference. The root contains tannin and grains of starch, elongate-oval in shape. The drug sold in Teheran came from Kermanshah and is probably intended to represent bistort, the rhizome of *P. Bistorta* Linn., but it differs from authentic museum samples of this drug. Schlimmer states that bistort root comes to Persia from Russia via Astrachan. Dymock informs us that the root of *P. vivipara* is a substitute for bistort in the Punjab, and the root Anjubar-i-rumi, not true bistort, and probably the root under notice, is imported into India from Persia. The root being very astringent is prescribed in cases of diarrhoea and dysentery.

Punica Granatum Linn. (Lythraceae). The flowers.

Gul a-nar (Teheran); Gul nare-farei (Schl.); Flores Punicae-granati (Ph. Pers.); Pomegranate flowers.

Achundow; Ait.; Post; I.H.B.; Fl. Br. Ind. ii. 581; Ph. Ind. ii. 45; Boiss. ii. 736.

The Pomegranate is a favourite tree in the East, where it is cultivated for its handsome flowers and edible and refreshing fruit, both of which are medicinal. It is indigenous in Anar-dara, Baluchistan, and eastward along the Suliman range to the Kuram Valley, into Kashmir and Kumaon. The fruit is the *Malus punicus* of the ancients, Balusitan of Persia and Arabia, and Anar of Baluchistan. In the trade the small Pomegranates are anar-dana, whereas the cultivated fruit is anar. They are exported in immense quantities to Afghanistan and India. The rind of the fruit is used for dyeing and tanning leather. The ancient Persians were acquainted with the taenifuge qualities of the root-bark. The dried red flowers are given in pyorrhoea and whooping cough (C).

Pyrethrum sp. (?). (Compositae). Root.

Katek bah (Teheran).

This drug consists of a tapering root with a few undeveloped leaves arising from the crown. The root has the characters of that

of a composite, and the leaves resemble those of a *Pyrethrum*. The sample is marked "Poison—used as an eye medicine."

Quercus spp. (Cupuliferae). The galls.

Giash mashi (Hamadan); Kisa, kesa (galls); Maju, mazu, marjun (Pers.).

Pharmacographia; Galls figured in Connold's British Oak Galls; Houard 375; Ait.; Ph. Ind. iii. 360.

On the oaks growing in Asia Minor, Syria, and Turkey a quantity of galls are produced which reach India *via* the Persian Gulf. In North-eastern Persia, where oaks do not occur, the galls are imported from other districts of Persia for dyeing and tanning.

The galls in the collection are produced by the insect *Andricus lucidus* Hartig., var. *orientalis* Trotter. This Cynipid makes galls on *Quercus robur* Linn., *Q. lusitanica* Lam. and *Q. mongolica* Fisch. The galls are found in Britain in March and April, but are rare. The bazaar specimens are probably brought from Asia Minor. The galls have long spines, which, however, are broken off in the bazaar sample from Hamadan. The galls are usually used by tanners and are sold in drug shops as an astringent medicine. The local drug is given as a febrifuge (C).

Quercus spp. (Cupuliferae). The saccharine secretion.

Pune (Teheran).

Under this name is supplied a confection or cake of sugary substance, green with the presence of broken leaves. It is considered to be a form of Tar-anjabin "green honey," or Gaz-anjabin "Tamarisk-honey." Layard referred to this substance in his "Early Adventures in Persia, Vol. i. p. 349." "The mountainous country beyond Fellaut is thickly wooded with the 'beloot' or oak. These trees are chiefly valuable for the white substance called by the Bakhtyaris 'gaz' or 'gazu,' a kind of manna. It is an article of export to all parts of Persia, and is everywhere sold in the bazaars, and employed in the manufacture of a sweetmeat called 'Gaz-enjubeen,' which is much relished and considered very wholesome. When boiled with the leaves and allowed to harden it forms a kind of greenish cake, not disagreeable to the taste, but prepared for the use of the ladies of the enderun and to be offered to guests, it is carefully skimmed and separated when it becomes a white paste of very delicate flavour." Dr. Aitchison remarks that the name Tar-anjabin would apply correctly to Layard's "greenish cake." The names Tiringibyn and Terendschabin are quoted by Ibn Baitar, Garcia da Orta, and Schlimmer, and in the Pharmacopoeia Persica as those of an important purgative in Persia, and have been referred to the product of the Camel-thorn (*Alhagi camelorum* Fisch. and *A. maurorum* Desv.). But the name, in all probability, has been transferred in other districts to other sources. The broken leaves embedded in the green cake called Pune are not those of an *Alhagi* or *Cotoneaster*, but are more like those of an oak. Oak manna, manna

quercina, Gueza-elefi of Schlimmer, has been obtained from the leaves and fruits of *Q. mannifera* Lindl. of Kurdistan, *Q. persica* Jaub. & Spach, *Q. tauricola* Kotsch. and *Q. valonea* Kotsch. According to Tschirch (Pharmacologie) and Wehmer (Pflanzenstoffe) saccharose, glucose, fructose, and mucilage, in varying proportions, have been separated from these secretions. Ebert (1909) showed that a sample of Taranjabin contained saccharose and no glucose. Manna of the Oak from Smyrna (Hanbury, Sci. Papers 287), found on the leaves of the dwarf oaks, is collected by the peasants, who use it instead of butter in cooking their food, and ascribe to it no purgative effect while it is fresh.

Rheum Ribes Gronov. (Polygonaceae). The plant and fruits.

Riwas, ribas (Teheran); Tukhm-i-riwas (Hamadan); Ribas, the Persian and Arabic name of the plant; Rhubarb fruits.

Boiss. iv. 1003; Ph. Ind. iii. 153.

The edible rhubarb is indigenous all over the moister localities from 3000 feet and upwards, occurring in great expanses on a northern exposure, on the Pawpamissus range, and the higher hills of Khorasan, marking the country most characteristically in the autumn with the brilliancy of its almost scarlet foliage. The fruit and rootstock of wild rhubarb are both collected to be employed in medicine. A decoction of the fruit is considered a more powerful purgative than that of the root-stock (Aitchison).

The fruits of this plant, sold in Teheran, are used as a vermifuge for horses. Also in Hamadan the drug is applied as a poultice for pain in the head and ears (C).

Rhus coriaria Linn. (Anacardiaceae). The fruits.

Sumagh (Teheran); Summaq (Pers.); Tartak (Hind.).

Achundow; Schl.; Boiss. ii. 4; Post; Ait.; Ph. Ind. i. 373.

The Sumach is a tree rhubarb in Khorasan, Western Afghanistan, and throughout Central Asia.

The leaves have long been used by the Arabs, Turks, and Persians, and in Europe, for dyeing and tanning leather and silk. They contain from 15 to 33 per cent. of tannin.

The fruit is exported from Persia and used by Mohammedans in India. The fruit is a small drupe, the size of a lentil, 5 mm. in diameter, red-coloured, acid and astringent to the taste, containing one lenticular, polished, brown, oily seed. These fruits are eaten and are reckoned as astringent in dysentery.

Ricinus communis Linn. (Euphorbiaceae). The seeds.

Kercheng (Hamadan); Karchak, garchak (Pers.); Tochme kertchec (Schl.); Khurwa (Arab.); Bed-anjir "Willow-fig"; Castor-oil seeds.

The Castor Oil plant is cultivated, round the margin of cotton, tobacco, or melon fields, throughout the country for its seed, from which the chief oil for burning is obtained. Aitchison noticed that

neither the seed nor the locally pressed oil is used in medicine, only the imported ' cold drawn ' oil is so used.

The above name for the seeds is probably derived from Kirchek in the Deilami language because the fruit is like a basket with a cover made out of date leaves (Ph. Ind. iii. 301).

Roccella Montagnei *Bél.* (Graphidaceae). The lichen.

Dowalah (Hamadan) ; Davāla, Dāvila (Pers.).

Achundow refers this drug to *Musculus arboreus*, and gives the Persian names as Dawalak and Karbasu and the Arabic name as Aschna (*Usnea* sp.). The Persian name Dowalah is applied to more than one kind of lichen, since Dymock gives *Parmelia Kamtschadalii* Esch. as the source of Dowalah of the Indian bazaars (Ph. Ind. iii. 627). Some of the *Parmelias* are used as a dye, but the above drug from Hamadan gives no coloration with caustic potash. It is a whitish or grey coloured lichen in broken pieces. It has emollient and astringent properties, and is used in a bath or as a poultice. Locally it is given for stomach troubles (C).

Rosa foetida *Herm.* (*R. lutea* Mill.). (Rosaceae). The flowers.

Gul-i-zard, " yellow flower " (Teheran) ; Gole zarde (Schl.).

A. Olivier (Voyage dans l'Empire Ottoman, l'égypt et la Perse, Paris, 1807) ; Boiss. ii. 671.

The Persian Yellow Rose is a cultivated shrub in gardens. This is the yellow Austrian Briar in a wild state extending from the Crimea and Asia Minor through Persia to Turkestan, Afghanistan, Punjab, to Eastern Tibet. Aitchison calls it the Gul-i-raman-zeba, " lovely flower," of the Hari rud Valley.

The flowers are given in colic and for diarrhoea. Gulangabin is a confection of rose petals made with honey.

Rosa hemisphaerica *Herm.* (*R. sulphurea* Ait.). (Rosaceae). The fruits.

Damaverah (Hamadan).

Ph. Ind. i. 574 ; Boiss. ii. 672 ; Post.

This rose occurs in Persia and Afghanistan and, according to Post, is extensively cultivated in Syria.

The drug consists of the hips of this species. They are erect, nearly globular, broader than long, from 10 by 7 mm. to 13 by 8 mm., crowned with the remains of sepals, red, wrinkled, with short protuberances outside. Within are several light brown, hard, smooth seeds, 4 mm. long, mixed with silky hairs. The fruits are hot, dry, and astringent ; they are given for stomach complaints.

Under the name of Ward, roses are found in Arabic and Persian works. In India the fruit of *R. canina*, as a medicine, is referred to as Dalik or Dog Rose (Dymock).

Rubia tinctorum *Linn.* (Rubiaceae). The root.

Runas (Pers.) ; Rounace (Schl.) ; Fuwwah (Arab.) ; Munjit (Hind.) ; Madder.

Ait. ; Boiss. iii. 17 ; Post 224 ; Schl. ; Ph. Ind.

The Madder plant grows from Persia to Spain. Aitchison says it is cultivated throughout the country in East Persia and takes three years for the proper size of the root to form. It is largely grown at Anar-dara, Koin, and Yezd, whence the root is exported in quantity to Herat. From Herat it is re-exported in all directions to Afghanistan proper and India, besides, in some bulk, to Turkestan. It affords a well known red dye for carpets. The root is used as a dye-stuff and a drug throughout the East.

Rumex obtusifolius Linn. and **R. conglomeratus** Linn. (Polygonaceae). The fruits.

Tukhm-i-hammāz (Teheran and Hamadan).

Boiss. iv. 1010 ; Ait. ; Post ; Ph. Ind. iii. 158.

The first of these widely-distributed species of dock yields a medicinal root known to the ancients as *Radix Lapathi*. But in Persia and India this and other species afford medicinal fruits. Those from Teheran belong to *R. obtusifolius* ; they have three wings, are net-veined, irregularly toothed, and are red and green coloured. They are used locally as a stomachic.

The fruits from Hamadan are from *R. conglomeratus*, and have shorter wings, not distinctly toothed. They are given in pyorrhoea.

The drug under this name, however, is not confined to these two species of *Rumex*. According to Dymock Gul-i-hamaz or "Dock flowers," in India, are afforded by the fruits of *R. vesicarius* Linn., a plant found all over Asia.

Salvia Hydrangea DC. (Labiatae). The flowers.

Gula arbore (Teheran) ; Gul-i-arba (Pers.) ; Issikuttuz (Turki) ; Sarsand (Bal.).

Boiss. iv. 606 ; Ph. Ind. iii. 94 ; Kew Bull. 1930, 459.

A handsome flowering plant of Persia, Baluchistan, and Afghanistan. The drug consists of the mauve flowers with green-veined bracts, and small, rounded, brown seeds. Dymock says this drug is allied to Jadeh, probably a *Teucrium*. The flowering tops of a *Moluccella*, having enlarged purple calyces and a balm-like odour, and the rose-coloured mucilaginous calyces of *Hymenocrater elegans* Br. are used in medicine in Persia under the name of Gul-i-serwaj.

In Tabriz the inflorescence of *S. Hydrangea* is used in making medicinal tea (Gilliat-Smith). In Teheran the drug is said to stop excessive menstruation.

Salvia sp. (Labiatae). The seeds.

Tukhm-i-khardal (Hamadan).

Tukhm-i-khardal is the Persian name for mustard seed, but here the seeds of a *Salvia* have been supplied. The seeds are rounded, 1 mm. in diameter, greyish-brown, smooth, with a minute round umbilicus ; a transparent mucilaginous coating is formed when the seeds are soaked in water. Aitchison, Schlimmer, and Dymock refer to species of *Salvia* being used in medicine under the name of

Kanocha. Dr. Stapf has shown that the Kanocha seeds of Ispahan, sold in the shops under the Persian name of Marv, are those of *S. macrosiphon* Boiss. (Ph. Ind. Appendix). The seeds are used locally, as mustard seeds, for making poultices. Those of *S. duplicifolia* Benth., called Maur in Baluchistan, are used for the cure of eye diseases.

Saussurea Lappa *C. B. Clarke* (Compositae). The root.

Butenak (Teheran); Patchak (Beng.); Kushta (Sans.); Kut (Hind.); Khost, Kust-i-talk, Bughenagh (Pers.); *Costum amarum* (Ph. Pers.); Indian *Costus*.

Ait. ; Fl. Br. Ind. iii. 376 ; Schl. ; Ph. Ind. ii. 296.

This soft, fragrant, whitish root comes from plants grown as a crown monopoly in Kashmir, and is exported to Persia, India, and China. This ancient drug was formerly called Arabian *costus*, as it was carried to Turkey and Europe by Arabs. It is greatly valued as a medicine throughout the East as far as China, and being costly is often adulterated. The root occurs in cylindrical pieces about 2.5 cm. or more in diameter, light-coloured, with an agreeable odour and a bitter and biting after-taste. It contains inulin but no starch. A second sample of Khost (Kust) from Hamadan was a smaller root, spirally twisted and lighter in colour. Various chemical principles have been separated from the root, some of which account for the violet-like odour :—*Costu-lactone* isomeric with *alantolactone* *costus* acid, *dehydrocostus lactone* and *costol*. *Costus* root is prescribed externally and internally for various complaints, and is taken locally to ward off the effects of snake and animal bites (C).

Sisymbrium Sophia *Linn.* (Cruciferae). The seeds.

Towdri (Teheran).

Ait. ; Schl. ; Boiss. i. 216 ; Ph. Ind. i. 118, 121.

These seeds resemble in size, shape and colour the drug *Tukhm-i-khakshir* (*Erysimum* sp.), except that they are dull and not shiny. They were grown at the Royal Botanic Gardens, Kew, in order that the correct species might be identified.

There are several kinds of cruciferous seeds known as "Towdri." The white varieties are somewhat pale and light red. A brown-coloured sort is sometimes met with under the name of "Black Towdri." The seed of *Lepidium Iberis* *Linn.* imported into India from Persia as *Kasis*, is one of the seeds called Towdri. Dr. Stewart, writing on the plants of the Punjab and Sind, states that the seeds of *Matthiola incana* R. Br., the Purple Gilly Flower, constitute one of the several kinds of "Todri." The drug is aphrodisiacal, fattening the body and purifying the blood.

Smilax China *Linn.* and **S. glabra** *Roxb.* (Liliaceae). The root.

Tchoube tchini (Schl.) ; Chub chini (Ind. bazaars) ; Tu fu ling (Chin.) ; Raiz da China (Port.) ; Tuber Chinae ; China root ; Chinese Sarsaparilla.

Schl. ; Laufer 556 ; Colloquios ; Ph. Ind. iii. 500.

The root is a famous remedy for the treatment of Morbus americanus (Syphilis) and was first introduced into Europe by the returning sailors of Columbus, and into India by the sailors of Vasco da Gama. It is mentioned by Indian writers of the 16th century; Garcia da Orta traced the source of the drug to China, and records a cure made in 1535. It was soon afterwards introduced into Persia by the Portuguese, and it is referred to by Mir Imad-ed-din, Mahmud of Shiraz, and Mir Muhammad Hashim, of Teheran.

Saponin has been found in the root (Kobert 1911 and 1916), but its therapeutic action is not considered very marked.

Solanum nigrum Linn. (Solanaceae). The fruits.

Taj-i-rizi, "the name may mean a crown of grapes or a crown of poison" (Aitchison); Anab etl thalib, "Fox's grapes"; Inab-ed-Dib (Arab.); Karezgi (Bal.); Wonderberry Plant.

Achundow; Boiss. iv. 284; Ph. Ind. ii. 550; I.H.B.

This species of *Solanum* is a common weed in Persia, where the plant is used as a vegetable, and the small black fruits with yellow seeds are medicinal. The ripe fruits are eaten in Baluchistan. The fruits of the Bittersweet (*S. Dulcamara* L.), under the name of Sag-anjar, "Dog's grapes," form a drug exported into India.

The fruits are considered laxative, and are employed in chronic enlargement of the liver.

Stachys germanica Linn. (Labiatae). The flowers.

Tuklejah (Hamadan).

This woolly species and its varieties are found in the Caucasus and in Europe. The drug consists chiefly of the sub-oblique calyces covered with tomentum, having five teeth, and with the remains of flowers and stalks. It is given to relieve stomach troubles.

Stachys lavandulaefolia Vahl. (Labiatae). The leaves.

Mardangush (Tabriz); Mardan-gusht, "Men's ears or fingers"; Marzangust, Zarangust (Pers.); Sansaq (Arab.).

Achundow; Ait.; Ph. Ind. iii.; Gilliat-Smith and Turrill, Kew Bull. 1930, 459.

This species of *Stachys* with purple flowers is found within Asia Minor, Armenia, Caucasus, Kurdistan, and Persia. The plant is one of the sources of an ancient Persian drug. Marzangust is mentioned by Abu Mansur, and is referred by Achundow to *Origanum Majorana* Linn. Dymock describes it under *Zataria multiflora* Boiss., a plant which, however, generally goes under the name of Zatar. Teheran and Hamadan bazaars afforded samples of Marzangust, one of which was a *Zataria*. Gilliat-Smith remarks that the inflorescence is sold in the bazaars of Tabriz and is made into an infusion and used locally as a remedy for spasms and stomach disorders.

Strychnos Nux-vomica Linn. (Loganiaceae). The seeds.

Kuchula (Teheran); Kachola (Pers.); Kotchouleh (Schl.).

Ait.; Schl.; Ph. Ind. ii. 459; Fl. Br. Ind. iv. 90.

Kuchula seeds are frequently referred to in ancient Persian works. In the Makhzan el adwiya they are said to have been used from very early times for paralysis. They are called Azaraki by Indian Mohammedans and are given for debility. The seeds are imported from India, and in Teheran, as in other parts of Persia, they are classified as a poison.

Aitchison says, "The seed of the Nux-vomica is imported freely into these parts (N.E. of Persia) as a valuable tonic, but it is chiefly employed by the nomad tribes for poisoning wolves and dogs, these animals frequently proving destructive to their flocks."

Tamarix gallica var. **mannifera** Ehrenb. (Tamaricaceae). The manna.

Gaz-anjabin, 'Tamarisk honey' (Teheran); Gaz-i-shakar, 'Tamarisk sugar.'

Ph. Pers. ; Ait. ; Boiss. i. 778 ; Ph. Ind. i. 161.

Aitchison collected in the Badghis samples of manna from this variety of *Tamarix* which the natives distinguish from the ordinary species *T. gallica*. The saccharine exudation of this plant is said only to be collected in South-eastern Persia, in the district of Kerman, where it is obtained in large quantities and exported in all directions. In other parts of Persia Gazanjabin is obtained from other species of Tamarisk and a similar sugary substance from other plants (see under *T. pentandra*).

The sample from Teheran is a dried cake of sugar. Ehrenberg believes the sugar to be formed as a result of the punctures of *Coccus manniparus* which attacks this Tamarisk in Persia, Arabia, Afghanistan, and Egypt.

Tamarix pentandra Pall. (*T. Pallasii* Desv.). (Tamaricaceae). The manna.

Ghesa humase (Teheran); Guize khouncar, ghez mazedj, hebbel asle (Schl.).

Tamarisk manna, by D. Hooper, Journ. As. Soc. Bengal, New Series, Vol. v. 1909, 31-36; Boiss. i. 773.

The various species of Tamarisk are the commonest shrubs or small trees found from Quetta to Balamtghab, and from Herat to Meshed, up to 3000 ft. At least six species are widely distributed in Baluchistan, and two of them, *T. articulata* Vahl (Siahgaz) and *T. pentandra* (Shingir gaz), have been observed to yield a sweet gum. The latter is known to give a saccharine secretion in the Helmand. The samples are similar; they are sweet, sticky, transparent secretions, quite soluble in water, and become hard and opaque when kept owing to the crystallisation of the saccharose.

Terminalia Bellerica Roxb. (Combretaceae). The fruits.

Balila, balile (Teheran); Belādu (Pers.).

Ph. Pers. ; Schl. ; Ph. Ind. ii. 5 ; Fl. Br. Ind. ii. 446.

These are the Baleric myrobalans of commerce, the Balilaj of Mohammedan writers, imported into Persia from India. They are astringent, and are made into a lotion for sore eyes.

Terminalia Chebula Retz. (Combretaceae). The fruits.

Halila, halile (Teheran); Halileh kabuli (Schl.); Hirada, harra, har (Hind.).

Ph. Pers. ; Schl. ; Fl. Br. Ind. ii. 447 ; Ph. Ind. ii. 1.

The ripe fruits of this tree are the Chebulic myrobalans of Indian commerce. The drug from Teheran consists of the unripe fruits of the size of raisins, said to come from Kurdistan. There are two forms of this drug known as Halileh-i-zangi and Halileh-Hindi. Myrobalans are a well known astringent and tanning agent, but in medicine they have been found to have tonic and aperient properties.

Teucrium Polium Linn. (Labiatae). The flowers.

Mariam mohodi, "Peas of Mary" (Teheran); Mariam nukhudi (Tabriz); Meriam mekhodi is the Teheran name for *T. scordioides* Schreb., according to Schlimmer, who gives Gole khenon as the Yezd name, and Erfieh and Erpeh as literary equivalents. The Merian gale of the Terminologie is referred to *Salvia officinalis* Linn., but according to Gilliat-Smith this plant, although cultivated in gardens in Tabriz, has no local name, and is not used by the natives.

Boiss. iv. 821 ; I.H.B. ; Ph. Ind. iii. 125.

The plant is the Poley Germander or Polion of the Greeks. The drug consists of the small woolly flowers mixed with some stalks and leaves. It has the fragrance of thyme, and is given as an infusion for internal disorders.

In Baluchistan *Teucrium Stocksianum* Boiss. is called Kalpora, and is a remedy for fever.

Thymus Serpyllum Linn. var. Kotschyanus Boiss. (Labiatae). Leaves.

Joshan Shirazi (Teheran); Zata (Post); Seetere (Schl.); Djūshā (Pers.).

Ait. ; Boiss. iv. 556 ; Post ; Schl. ; Fl. Br. Ind. iv. 649 ; Ph. Ind. iii. 114.

The habitat of this variety is Persia and Kurdistan. The leaves are rounded, cuneate, ovate to lanceolate or elliptical, with prominent nerves below. The leaves are fragrant, and resemble those of *Zataria multiflora*, a plant which also receives the name Zatar. Seetere is the name given by Schlimmer to *T. Kotschyanus*, while Post applies the Arabic name Zatar to all plants of the genus *Thymus*. Boissier on the other hand refers Zatar to *Origanum Maru* Linn., Zatar farisi to *T. capitatus* Linn., and Zaeteran to *T. decussatus* Boiss. It would thus appear that Zatar and Joshan Shirazi are similar drugs, characterised by a thyme-like aroma. The leaves are carminative. In Teheran they are given for "too much water in the stomach," probably meaning the disease called ascitis.

Trachydium Lehmanni Benth. & Hook. (*Malabaila Sekakul* Boiss.). (Umbelliferae). The root.

Shekakul (Pers.); Segagoul (Arab.); Chakha-khoul (Turki); Chighaghole metri (Schl.); Parsnip of the desert.

Schl.; Post, 368; Boiss. ii. 891; Ait.; Ph. Ind. ii. 136.

The roots of this and other umbelliferous plants are collected in Persia and Afghanistan, and exported to India *via* Herat as a medicine. They have the thickness of an ordinary pencil at the top of the root, and are about two inches in length, tapering very rapidly to a point. It is called "The Root of Wisdom" and "Wild Carrot root," and is considered very valuable as a diet for improving the memory and increasing brain power. The name is applied to other stimulating and nourishing roots eaten by women for improving their *embonpoint*. The roots of *Caucalis*, *Pastinaca*, *Eryngium* and *Eremodaucus* are among the drugs of this class used as food for the sickly and convalescent.

Tribulus terrestris Linn. (Zygophyllaceae). The fruits.

Khahasak (Teheran); Kharkhasak, khasak or hasak of the Arabs and Persians; Pakra (Hind.); Tribolia (Modern Greek).

Achundow; I.H.B.; Fl. Br. Ind. i. 423; Ph. Ind. i. 243.

This plant is found in the sandy districts of Guzerat and Kathiawar in North-western India, where the fruits are collected for the market. The drug is mentioned by Dioscorides and Pliny, and in the Bower mss., and by many Eastern writers. The fruit, of the size of a small bean, has 5 cells, dividing into 5 cocci, each of which is wedge-shaped, armed with 4 strong prickles. The seeds are oily and are enclosed in hard stony cells.

The fruits are used as a diuretic. Dr. Sayed Khan of Teheran says they act as a charm in bladder troubles. Duhn-ul-hasak and Rughan-i-char-i-chesak are names for an oil prepared from the fruits which is applied for rheumatism. In Baluchistan the plant is made into a paste with water and this is taken as a tonic and cooling medicine.

Trigonella cancellata Desv. var. *arcuata* C. A. Meyer (Leguminosae). The pods.

Iklil-il-malik (Teheran); Aketi, akentin (Hamadan); Usleib el malek (Post).

Abu Mansur; Boiss. ii. 71; Post; Ph. Ind. i. 404.

The origin of this drug has been referred to *Melilotus hamosa* Link, which has falcate pods, and *T. uncata* Boiss., whose pods are not so curved as those from Teheran and Hamadan.

The pods are horse-shoe shaped, about 2.5 cm. in length, greyish-white, curved outwards, grooved on both sides, and beaked; they are divided by a central partition and contain greyish-yellow, rhomboidal seeds, notched at one end, and with black spots.

The pods are used for various disorders, but chiefly as a suppurative and astringent. Sometimes they are made into a plaster for dispelling tumourous and painful swellings.

Trigonella Foenum-Graecum Linn. (Leguminosae). The herb and seeds.

Shambalila (Teheran); Tukhm-i-shambalila (Hamadan); Shamli, shamlid, shamlit (Pers.); Hilbah (Arab.); Hulbat (Ach.). Ait. ; I.H.B. ; Boiss. ii. 70 ; Post ; Ph. Ind. i. 402.

The clover, Fenugreek, is cultivated universally in gardens as a pot-herb, and occasionally, especially at Herat, as fodder for cattle. The plant grows freely round Teheran. The leaves are commonly used for poultices. The seeds are among articles of export from Karachi to Bombay. They form an ingredient in cattle foods, and are regarded as stomachic and cordial.

T. polycerata Linn. in Baluchistan is called Shimsh and is considered a wild lucerne and used as a fodder for horses and sheep.

Veratrum album Linn. (Liliaceae). Rhizome.

Kondush (Hamadan) ; Kondochi, kondoce (Schl.) ; Hellebore root. Boiss. v. 171.

The White Hellebore is a plant of Europe, Central Asia, and Japan. The root is mentioned in the herbals of Hippocrates and Galen. The rhizome is dark brown, cylindrical or slightly tapering, 2.5 cm. in diameter, with numerous scars of broken rootlets ; whitish within. It contains a poisonous alkaloid, jervine. The root is one of the Persian poisons.

Viola spp. (Violaceae). The flowers.

Gul-i-banafsha (Pers.).

Abu Mansur ; Ph. Pers. ; Ait. ; Boiss. i. 450 ; Post, 118 ; Ph. Ind. i. 141.

Flowers of the Violet plant are exported from Persia to India, where they are regarded as a valuable medicine. It is not possible to identify the species of violet which constitute the dried broken flowers from Teheran. They have a diuretic and expectorant action. Dr. Sayed Khan of Teheran finds the drug to be useful in low fever where quinine is not available.

Withania somnifera Dunal. (Solanaceae). The root.

Busidan (Hamadan) ; Ashgand (Hind., Guz.) ; Sekran (Syr.) ; Hajarat el dib, " Wolf's tree " (Arab.).

Boiss. iv. 287 ; Fl. Br. Ind. iv. 239 ; I.H.B. ; Post ; Ph. Ind. ii. 566 ; Kew and Pharm. Soc. Museums.

An unarmed shrub with ovate, woolly leaves, inhabiting the South of Europe, Syria, Arabia, Baluchistan, India, and Africa. The roots are long, tapering, light brown, with knotty crowns 1.2 to 2.5 cm. in diameter, plump, smooth, white internally, with a short starchy fracture. The starch is rounded or oval with large hilum and a few granules truncated. The taste is mucilaginous and slightly bitter. From the observations made on the nature of this plant, and the specific names *somnifera* and *hypnotica* given to it by botanists, it would appear to be harmful to human beings when grown under certain conditions. In Hamadan the root is considered a poison,

and in parts of Arabia animals refuse to graze on the plant. In Baluchistan, however, it is said to be a vegetable and fodder for goats. Duthie says the shrub is alterative, and the root is given to horses. The leaves are used as a fomentation for sore eyes, and they are said to reduce boils and swellings, and to kill lice. F. B. Power and A. H. Salway (Proc. Chem. Soc. 1911, 27, 85) found evidence of an alkaloid and other crystalline principles in the root. But it contained no mydriatic alkaloid, and physiological tests failed to confirm the sedative and hypnotic properties attributed to it.

Zataria multiflora Boiss. (Labiatae). Leaves and stalks.

Zatar (Hamadan); Saatar (Indian bazaars); Izgun; isghand (Bal.).

Boiss. iv. 561; Post; I.H.B.; Ph. Ind. iii. 114.

This small plant is found in the hills of Muscat in Arabia, Persia, and Baluchistan. This species is allied to *Z. bracteata*, which sometimes bears the same vernacular names.

The small, thick, orbicular and glandular-dotted leaves have the odour of thymol, and are credited with the carminative properties of thyme and mint. In Baluchistan the plant is said to be good for stomach complaints.

A sample of broken stems and a few leaves labelled "marjan-just" from Teheran had the characters of this plant. (See *Stachys lavandulaefolia*).

Zizyphora tenuior Linn. (Labiatae). The herb.

Kakuti (Teheran); Kahkuti (Bal.).

Boiss. iv. 587; Ait.; I.H.B.; Ph. Ind. iii. 115.

A small labiate with spiked flowers found in Persia, Baluchistan, and Afghanistan. Aitchison says it is much used in medicine owing to its strong aroma of peppermint. In Baluchistan the plant is taken to allay fever, and the seeds, powdered and mixed with butter-milk, are used to cure dysentery. In Teheran the herb is employed as a cordial and stomachic.

Zizyphus vulgaris Linn. (Rhamnaceae). The fruits.

Anab (Teheran); Konar (Pers.); Connaros (Gr.).

Achundow; Boiss. ii. 12; Ph. Ind. i. 350; Post.

The indigenous form of the jujube is a shrub, rarely a tree, in the hills from the Badghis eastward to Kashmir. It is cultivated in all orchards for its fruit, which is largely eaten by the natives, especially on journeys, and this Dr. Aitchison thinks may account for the spread of the tree throughout the whole of Asia, wherever caravan journeys were made.

In Teheran it is said that the leaves are chewed as a drug, and the effects resemble the action of cocaine.

The fruits, which are sweet and wholesome, are the origin of the confection called the jujube. The fruits are imported into India; they are used as a demulcent and medicinally from the Persian Gulf to China.



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Plants and People in Ancient Anatolia

By Mark Nesbitt

PLANT PRODUCTS HAVE ALWAYS played a vital role in the Near East: most importantly as food, but also as fuel, building materials, medicines, and for a host of other uses. In the past, the cultivation of crop plants was the major occupation of most of the population, which literally lived or died by its success in food production. Given the status of crop production as the major economic activity in pre-industrial societies, clearly it must form a central part of any study of ancient civilizations. Equally importantly, study of plants in the past will illuminate the daily life of the villagers who formed the great bulk of the people.

Until the 1960s archaeologists showed little interest in such topics, in part reflecting the priorities of art history and text-based history in determining the objectives of excavations; in part reflecting practical difficulties in recovering and studying plant and animal remains from archaeological deposits. Major changes in archaeological thinking occurred in the late 1960s—the “New Archaeology”—with two major consequences for archaeological practice. First, there was a shift to thinking about past societies as interlinked processes—“systems”—in which all the elements were important and in which individual sites or historical events could not be studied in isolation. Secondly, the basis of how we recover and interpret the archaeological record became a topic in its own right for questioning and discussion. Agriculture and diet were seen as integral to an understanding of the past, and there was a resulting keen interest in sampling methods for

biological remains.

New techniques of flotation for collecting plant remains and dry-screening for bones were developed and as an ideal, if not in practice, results were integrated with studies of soil, pollen, and landscape history. Archaeologists working on excavations in Turkey were at the forefront of these developments in archaeological science, and my purpose in this article is to survey what has been achieved after thirty years.

Archaeobotany in practice

The archaeobotanist's work falls into three parts: in the field, in the laboratory, and at the computer. In the field, the initial tasks are to build a flotation machine and to supervise the collection of samples from the excavation trenches for flotation. Sampling strategy depends both on the nature of the excavated deposits, and the research questions posed for the site. When not engaged in flotation, the archaeobotanist will be found studying the local flora and talking to villagers about their crops and wild foods. Back in the laboratory, the time-consuming task of sorting the “flots” under a stereoscopic microscope begins. Each sample contains a mixture of different types of plant remains, including seeds and

Archaeobotany in Turkey, Past and Present

The study of plant remains from archaeological sites is known as archaeobotany or, more often in North America, as palaeoethnobotany (the two words are synonyms). The materials studied cover a wide range: from wood, seeds, tubers, and other plant parts, to pollen and phytoliths. All these types of remains require a common approach: using techniques based in the biological sciences to identify and interpret plant remains, but addressing questions rooted firmly in an archaeological framework (Greig 1989; Hastorf and Popper 1988; Miller 1991; Nesbitt 1993a; in press a; van Zeist and Casparie 1984). Originally, archaeobotanical services were often provided by botanists to archaeologists, but today archaeobotanists are archaeologists just as much as trench supervisors or specialists in ceramics and are usually working in archaeology or anthropology departments.

The earliest reports on plant remains from Turkey (indeed, one of the earliest anywhere) were published in the 1880s by the Berlin botanist L. Wittmack (1880, 1890, 1896) on crop seeds from Heinrich Schliemann's excavations at Troy and the Koertes' work at Bôzhöyük. This pioneering effort did not result in any continuing interest, and few plant remains were collected until the 1950s, when the dynamic Danish archaeobotanist, Hans Helbaek, began working on Near Eastern sites. A stream of reports followed, on sites of every period, which established the framework on which all future work has been based. In Turkey, Helbaek worked with James Mellaart at Beycesultan, Çatal Hüyük, and Hacilar (Helbaek 1961; 1964; 1970), and with the Braidwoods on the Amuq plain (Helbaek 1960). In the late 1960s, Willem van Zeist from the Netherlands and Gordon Hillman from England began working in Turkey (Hillman 1972; 1978; van Zeist 1979/80; van Zeist and Bakker-Heeres 1975; 1982; van Zeist and Buitenhuis 1983). Although interest in archaeobotany has been strong since the 1960s, a shortage of trained staff was a major factor in limiting the number of excavations at which large-scale sampling was carried out. Even today, as archaeobotany becomes better integrated into university courses in archaeology, fewer than twenty archaeobotanists work in the Near East as a whole.

The Raw Materials of Archaeobotany



Ash heap outside a current-day house near Lake Van, eastern Turkey. Such middens are often found outside excavated houses. Resulting from the accumulation of dumping ashes, bones, and broken pots over many years, these are a valuable archaeological resource. *All photographs by Mark Nesbitt except as noted.*

Plant remains fall into two classes. *Macroremains* are large enough to be visible to the naked eye and include seeds and wood remains. *Microremains* must be viewed with a microscope and include pollen and phytoliths. The two classes enter the archaeological record in quite different ways and are sampled and interpreted differently.

Macroremains

In truly arid areas, such as the Egyptian desert, plant remains will often survive intact in archaeological deposits. However, in most of the Near East, including Turkey, winters are wet, and any plant materials will soon be consumed by animals or fall victim to rot. To survive, botanical remains must be in a biologically inert form that is not susceptible to decay. Charring is one of the most important routes to preservation. Seeds, wood, or other plant parts that come into contact with fire will often burn to ash, but much will not burn completely and ends up charred—black, but retaining much of its original dimensions and appearance. Although largely composed of carbon, other organic material does survive within, and lipids and DNA have both been successfully extracted from charred seeds (Brown, Allaby and Brown 1994; Brown et al 1993; Hillman et al 1993; McLaren, Evans and Hillman 1991). Residues of food and other organic substances can also be charred, and chemical analysis shows promise for identifying these (Heron and Evershed 1993; Mills and White 1989).

Contact with fire can occur in two ways: when houses burn down (a relatively common event in prehistory), or through the everyday disposal of household refuse into hearths and ovens, and the eventual disposal of their cinders into middens and pits—the garbage cans of antiquity. Obviously, there is a big difference in the type of samples that will be preserved by each of these routes, and

this in turn will affect sampling strategies. In burnt destruction levels the contents of pots, silos, and other stores will be burnt in situ often well preserved by an overburden of fallen roof material. These primary deposits will be easily found in excavation of the debris resulting from the fire, and sampling simply involves recording their location and bagging the seeds. Household refuse is more complicated. As every household had at least one fireplace, the center for all cooking and heating activities, very large amounts of plant remains became charred and were incorporated into the archaeological record. Although ovens and hearths usually do contain some ashes, they were often cleaned out and their contents deposited elsewhere—in pits, in alleyways, or on the edge of settlements. As middens accumulated, ashes and other refuse became mixed with soil and decayed mudbrick. When excavated, this type of deposit often gives the misleading impression of sterile earth which does not contain plant remains. Here, flotation is essential to release charred plant remains from the soil matrix. Prior to the development of flotation techniques in the 1960s, it was often thought that plant remains did not survive except in destruction levels.

A wide range of plant materials can be preserved by charring, including seeds, chaff, tubers, straw, and wood.

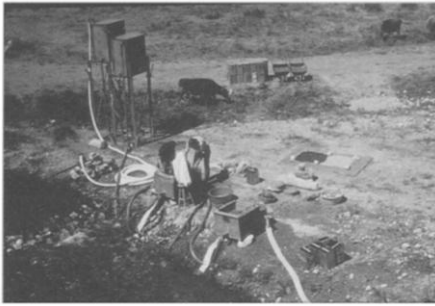
Microremains

Pollen grains are tiny spores that fertilize the female part of the flower and are often distributed by wind or insects. The outer coat or exine of pollen is resistant to decay in anaerobic conditions such as in lake beds and bogs. Difference in the appearance of pollen grains allows their identification, usually to family or genus level. By examining the changing proportions of different pollen grains in cores from lake beds, changes in vegetation through time can be identified. Pollen analysis is an important tool for looking at vegetation on a regional scale (Bar-Yosef and Kra 1993; Bintliff and van Zeist 1982; van Zeist and Bottema 1991). Pollen grains survive poorly in typical archaeological deposits in the Near East and are therefore not usually sampled from archaeological contexts (Bottema 1975).

Phytoliths are silica bodies that form within certain plant cells. After plants die and decay, phytoliths are deposited in archaeological soils, from which they can be extracted in the laboratory. Phytolith analysis is a young field, but first results suggest this will be a useful tool once identification techniques are further developed (Mulholland, Rapp and Gifford 1982; Rapp and Mulholland 1992; Rosen 1987; 1989; 1991). Possible uses of phytolith analysis include the identification of plants under-represented in charred plant remains and, in conjunction with studies of soil micromorphology, studying the detailed histories of archaeological deposits (Matthews and Postgate 1994).

The flotation revolution

Flotation works on a simple principle: soil particles sink, charred plant remains float.



Flotation at Aşvan Kale, eastern Turkey in the early 1970s. One of the first flotation machines, its bulky design has been replaced by more compact flotation tanks that can easily be operated by one or two people. *Photo courtesy of Gordon Hillman.*

Water is pumped through a valve halfway down the tank. Once the tank is full of water, soil from an archaeological deposit is poured gently into the tank. As the lumps of soil disaggregate, silt drops to the bottom of the tank and plant remains float to the top and are carried by the water flow through a spout and into 1 mm and 0.3 mm sieves. The flot from each sample is wrapped in cloth and gently dried in the shade before bagging up for future study. A 1 millimeter plastic mesh (widely sold in Turkey as mosquito screen) lines the top half of the tank, and catches heavy items as they sink. This *heavy residue* will contain a range of bones and artifacts and offers an excellent check on their recovery from the site. At early or coastal sites the ability of the flotation machine to recover tiny bones from fish and wild animals and small artifacts

such as microliths and beads is just as important as its role in collecting plant remains. The contents of the heavy residue are also a good indicator as to whether any of the plant remains are sinking—a particular problem with dense seeds such as nuts and pulses.

The large capacity of the flotation machine means that a wide range of deposits can be sampled without slowing down excavation. It is important that enough soil is processed from a deposit, as the density of plant remains is often low. Soil volumes for a sample might range from 50 liters at a typical Bronze or Iron Age settlement mound to 500 or 1000 liters at a Palaeolithic or Neolithic site, where seed densities are much lower. The key ability of the flotation machine is that it achieves a good yield of material from virtually all sites. Furthermore, it is cheap (about \$200 for the machine) and flexible. If water is in short supply, a recycling tank can be used. If electricity is not available, a petrol pump can be used. Any blacksmith can build a flotation machine, and they are long-lasting.



Charred seeds and charcoal flow out of the flotation tank into two sieves. Disaggregation of archaeological soil in water ensures that as little as possible of the fragile charred material is damaged during the recovery process.

charcoal, and these must be separated into categories and identified.

Identification works on the simple principle of comparing ancient, unknown seeds to modern, known seeds collected from carefully classified modern plants. The “seed reference collection,” often numbering several thousand specimens, is the core of an archaeobotanical laboratory. Once the seeds have been named, counted, and the results entered onto a computer scoresheet, interpretation can finally begin. It is this step, when we move from the “laundry list” of names and numbers to what they mean about human behaviour in the past, that is the most exciting and most challenging part of our work.

What mean these seeds?

Interpretation of plant remains from a burnt destruction level is relatively straightforward. Such deposits often come from crops cleaned for storage: for example, a silo of wheat grains or a jar of lentils (Jones et al. 1986). Interpretation hinges on accurate recording of each deposit, sometimes a tricky procedure in the tangle of ashes and collapsed roofs typical of a burnt level. For example, a single room burnt at Sardis by invading Persians in the mid-sixth century BCE was found to contain seven deposits of barley, two of bread wheat, one of chickpeas, and one of lentils. In some cases the seeds were found in their original jar, but most were probably stored in sacks which have not survived burning, leaving heaps of seeds on the floor. A group of garlic cloves was found at the base of a wall; it may have fallen from a hanging shelf. Overall the finds suggest a diet in which barley was most important, and a relatively small number of crops formed the staple foods. However such a deposit is only a snapshot of what was found in one room on one day.

In contrast, flotation samples from hearths, middens, pits, and other such contexts offer a much broader picture

Ethnoarchaeology

How do we bridge the gap between identifying seed assemblages from archaeological samples and deciding what these mean in terms of human behavior? Archaeobotanists are fortunate in being able to visit villages where traditional farming is still practiced, and where we can directly observe agricultural activities and their resulting effects on the material world. It is the focus on material culture that separates ethnoarchaeology from social anthropology: we cannot interview our prehistoric subjects, and we must therefore enable their material remains to speak for them (Jones 1983).

In the early 1970s Gordon Hillman spent four excavation seasons at the village of Aşvan in southeast Turkey, destined to be submerged by the Keban dam in 1974. By observing farming activities, collecting samples of crops during processing, and talking to villagers, he was able to show that the composition of seed assemblages was diagnostic of the processing that farmers had undertaken (Hillman 1973; 1981; 1984a; 1984b; 1985). These processes are complex, ranging from husbandry activities such as irrigation and weeding, to the sequence of crop processing by which the plants growing in the field are harvested and prepared for cooking. The crop-processing sequence for cereals such as wheat and barley is a multi-phase process, involving threshing to break up the ears, winnowing, and a series of sievings. Each of these steps generates a distinctive waste by-product assemblage as well as the main crop component destined to pass to the next phase of processing.

A failure to appreciate the effects of crop-processing can lead to major misinterpretations. A simple example is the presence of weed seeds in a sample. Processing of a single sheaf of wheat would result in a final end-product—clean wheat grains—but also by-products composed of light weed seeds and chaff from winnowing; large, heavy weed seeds and chaff from sieving with a large mesh; and small weed seeds and chaff from fine sieving. It would be a mistake to interpret the lack of weed seeds in the end-product as meaning the original crop had no weed infestation, while it would also be wrong to regard the mixture of weed seeds and chaff in a sieving by-product to be typical of ancient diet.

Archaeobotanists are using the ethnoarchaeological results from Hillman's work and that of later projects in Greece and elsewhere, combined with statistical techniques, to establish the nature of each of their samples before tackling wider questions of interpretation. Ethnoarchaeology has been used to look at other aspects of daily life such as the use of stone grinding tools and the functions of different types of ovens. Decision-making in traditional agriculture is another important line of enquiry,



Current day farmers are a valuable source of information. These villagers in the Pontic mountains have excellent recall of agricultural practices from the days before tractors and chemical fertilizers.



Bulgur-making in progress. A seten is used to remove the bran from boiled wheat grains. The pressure of the vertical millstone on moistened grain causes the bran to slide off. We still know all too little about food preparation in antiquity. As food rarely enters the archaeological record, we must rely on interpreting food-related artifacts.

with implications for how we interpret changes in agricultural practices in the archaeological record. Wild plants are still an appreciated food supplement, and their use can give insights into the diet of pre-agrarian hunter-gatherers, as well as farmers' use of gathered plants as supplemental foods.

Rural life is changing fast in the Near East, and there is an urgent need for more ethnoarchaeological work while traditional crops and techniques are still in use.

of plant use. This is because the ashes in these deposits usually accumulated from a number of activities. Sardis is a good example of how flotation samples from redeposited seed assemblages can give different but complementary results to seeds from burnt levels. Flotation of a series of unburnt floor levels adjacent to the burnt level showed that barley was present in all the samples, while bread wheat was present in sixty percent of samples. Compared to the burnt level, these results confirm the importance of barley but suggest bread wheat was under-represented in the burnt room. A further five crops were found in the flotation samples that were absent from the burnt level: millet, grass pea, bitter vetch, grape, almond, and flax. Additionally, weed seeds and chaff were present—highly informative classes of plant remains totally lacking from the cleaned storage samples. It is significant that garlic was not found in the flotation samples—herbs and spices rarely enter the archaeological record because they are used in small, carefully husbanded quantities. Such plant products most often found in burnt levels and other exceptional contexts, such as shipwrecks (Haldane 1990; 1991; 1993).

Unlike a potsherd or coin, plant remains carry no obvious indication of their age and must be dated using evidence from careful stratigraphic excavation. The recent development of Accelerator Radiocarbon—Dating has allowed individual seeds weighing a hundredth of a gram to be radiocarbon dated—a valuable check, especially with contentious early material (Harris 1986).

The origins of agriculture

One of the great successes of archaeobotany has been unravelling the early history of farming. The development of agriculture is a critical turning point in the development of human society (Harlan 1995; Harris and Hillman



Excavation of a typical round house at Hallan Çemi, southeast Turkey. These solid architectural remains, combined with a rich material culture and biological evidence, point to year-round occupation of these pre-agrarian villages by foragers eating a wide range of wild plants and animals.

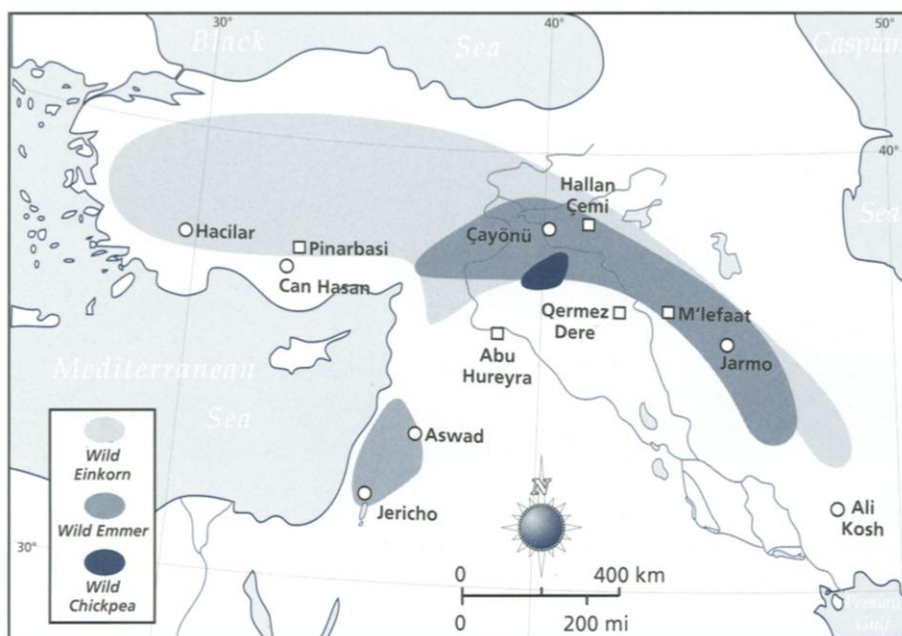
1989). After the origin of agriculture, there is a rapid increase in population and spread of farming villages, and later on agriculture underpins the development of the first literate civilizations in the early cities of Mesopotamia. Yet, until recently, there was little hard evidence which could be used to explain this remarkable human invention. Plant remains or bones had hardly been collected from pre-agrarian or early agricultural sites.

Interdisciplinary, integrated research projects have been essential in understanding the dynamics of early agriculture and the preceding hunter-gatherer cultures. Botanists have demonstrated that the wild ancestors of crop plants such as wheat, barley, lentils, and chickpeas grow only in the Near East, showing that they must have been taken into domestication in this region (Zohary and Hopf 1993). Excavators, using radiocarbon dating, have shown that the earliest Neolithic villages—settlements based on farming—occur in the Near East, at about 10,000 years ago. As one moves

away from the Near East, the earliest farming settlements are later in date—consistent with the spread of farming from its central area of origin. Archaeobotanists have shown that Near Eastern sites dating more recently than 10,000 years ago have domesticated crops, while earlier sites only have remains of gathered, wild plants (Miller 1992; van Zeist 1980).



Fields of wild cereals in oak woodland, near Hazar Lake in southeast Turkey. These dense stands of wild einkorn, wild emmer, and wild barley may resemble the landscape exploited by hunter-gatherers prior to the beginning of agriculture 10,000 years ago.



Early sites and the distribution of selected wild ancestors of crops. Squares indicate pre-agrarian sites; circles indicate early farming villages. The arc of low mountains that stretches from the Levant, through southern Turkey and northern Syria to Iran is rich in the wild ancestors of crops, and the origins of agriculture certainly lie in this area.

In outline the picture is reasonably clear. In the upper Palaeolithic humans gathered the wild plants and hunted the wild animals of their environment. At a site in oak forest, such as Hallan Çemi on a tributary of the Tigris in southeast Turkey, the diet included wild almonds and *Pistacia* nuts, wild pulses, and the seeds of riverside plants such as club-rushes (*Scirpus maritimus*) and knotweed (*Polygonum*). A thick layer of charred fruits of a tumbleweed (*Gundelia tournefortii*) was also found, perhaps the remains of an unsuccessful attempt at extracting the oily fatty seeds (Rosenberg and Davis 1992; Rosenberg, Nesbitt, and Redding in press). At sites such as Abu Hureyra and M'lefaat farther to the south, in the steppe woodland of northern Syria and Iraq, fewer forest plants were used (Hillman, Colledge, and Harris 1989). Large quantities of wild cereals, wild pulses, and terebinth nuts (*Pistacia*) were collected, as well as an extremely diverse range of other plants—at Abu Hureyra from about 130 different species. Some of these hunter-gatherer villages contained well-built houses and were probably

occupied year round.

About 10,000 years ago, somewhere within the “fertile crescent” that is so rich in these wild ancestors of crops, foragers began to collect and sow the seeds of wild plants they had previously simply gathered. During harvesting the first farmers unconsciously imposed selection pressures on wild plants that led to domestication. Most importantly, crops lost their ability to disperse their seed without human intervention. Cereal ears, for example, remained intact at maturity rather than shattering and scattering the seeds. The advantage of such changes to farmers is obvious—seeds stay on the ear during harvesting, rather than falling to the ground (Hillman and Davies 1990; 1992).

It is still unclear exactly where in the Near East the first steps to agriculture were taken. Some of the wild ancestors of the “founder package” of crops that appears at most Neolithic sites grow all over the hilly flanks of the “fertile crescent;” some are more restricted. Wild barley, lentils, and peas are widespread all over the fertile crescent. Wild emmer wheat

grows widely but is much more abundant in the Levant; wild einkorn wheat mainly grows in southern Turkey and adjacent areas; chickpea is restricted to a narrow region of southeast Turkey. Most likely, we will never know exactly where or over how wide an area of the Near East agriculture originated, as farming techniques probably spread very quickly, and crops would have been domesticated in different areas, quickly merging to form a founder “package” of Neolithic crops. It is also likely that the distribution of wild ancestors has changed with time. However, in view of the evidence for early settlement and its wealth of wild ancestors of crop plants, it is likely that Turkey played a crucial role in the origins of agriculture.

Why hunter-gatherers began farming is a topic of hot debate. In the 2000 years before farming began, global environmental changes occurred as the ice age came to an end. Pollen diagrams show that a wetter and warmer climate in the Near East led to the spread of forest into the steppic interior of Anatolia and other large land masses (van Zeist and Bottema 1991). It seems likely that these changes caused instability in existing hunter-gatherer life, perhaps leading to increased population, and that increased demand for food led to the first experiments in agriculture. A major barrier to a better understanding of this period is the paucity of known early sites. These are often low mounds that are difficult to locate by archaeological surveys. At present only two such sites from the period immediately preceding the Neolithic have been excavated in the interior of Anatolia: Pinarbaşı and Hallan Çemi. The situation is similar for the earliest Neolithic: a few more sites are known, but plant remains have been published from only one early farming village, Çayönü, dating between 7500–6000 BCE (van Zeist and de Roller 1991/1992). Further advances in studying agricultural origins will hinge on finding more early sites and on ensuring that

excavators undertake the full recovery of plant and animal remains.

Changing crops, changing cultures

How should we interpret the waning and waxing fortunes of different crop species? Even on the broad scale of Turkey as a whole, major changes through time are apparent (Hubbard 1980). Are these simply chance variations, or can we relate these changes to wider economic patterns? Observation of farmers' decision making, whether in a Near Eastern village or on the North American prairies, shows that decisions on what is grown and how it is grown are directly linked to market forces—whether these are responses to consumers, or imposed by central government. Choice of crops is not a matter of chance, and it would not have been in the past. But how can we apply this insight to archaeological plant remains?

Einkorn wheat and emmer wheat make a good case study. These archaic cereals are distinct from most other wheats in having seeds enclosed by a tough husk, the glumes (Charles 1984; Harlan 1967; Samuel 1989; 1993). This characteristic means that vigorous pounding is required to release the seeds, but it also protects them from pest damage while in storage. Emmer and einkorn were among the Neolithic founder species, appearing at the earliest farming sites, and spreading west as far as the British Isles and east to India and beyond. Today these wheats are on the verge of extinction, their cultivation restricted to remote mountainous areas scattered across Europe, southwest Asia, India, and Ethiopia. Archaeobotanical evidence from Turkish sites shows that up to about 3000 BCE they are grown alongside other cereals such as macaroni and bread wheats and barley. However, at the beginning of the Early Bronze Age, about 3000 BCE, both emmer and einkorn wheat abruptly disappear from the archaeological record in southeast Turkey, never to reappear



Wild pea. A wide range of wild pulses are found at pre-agrarian sites, only a few of which were domesticated. The beginning of agriculture saw a narrowing of the food base from a hundred or more wild species to less than ten crops. *Photo courtesy of Ann Butler.*

(van Zeist and Bakker-Heeres 1975; author's unpublished data from Aşvan).

Why did this happen?

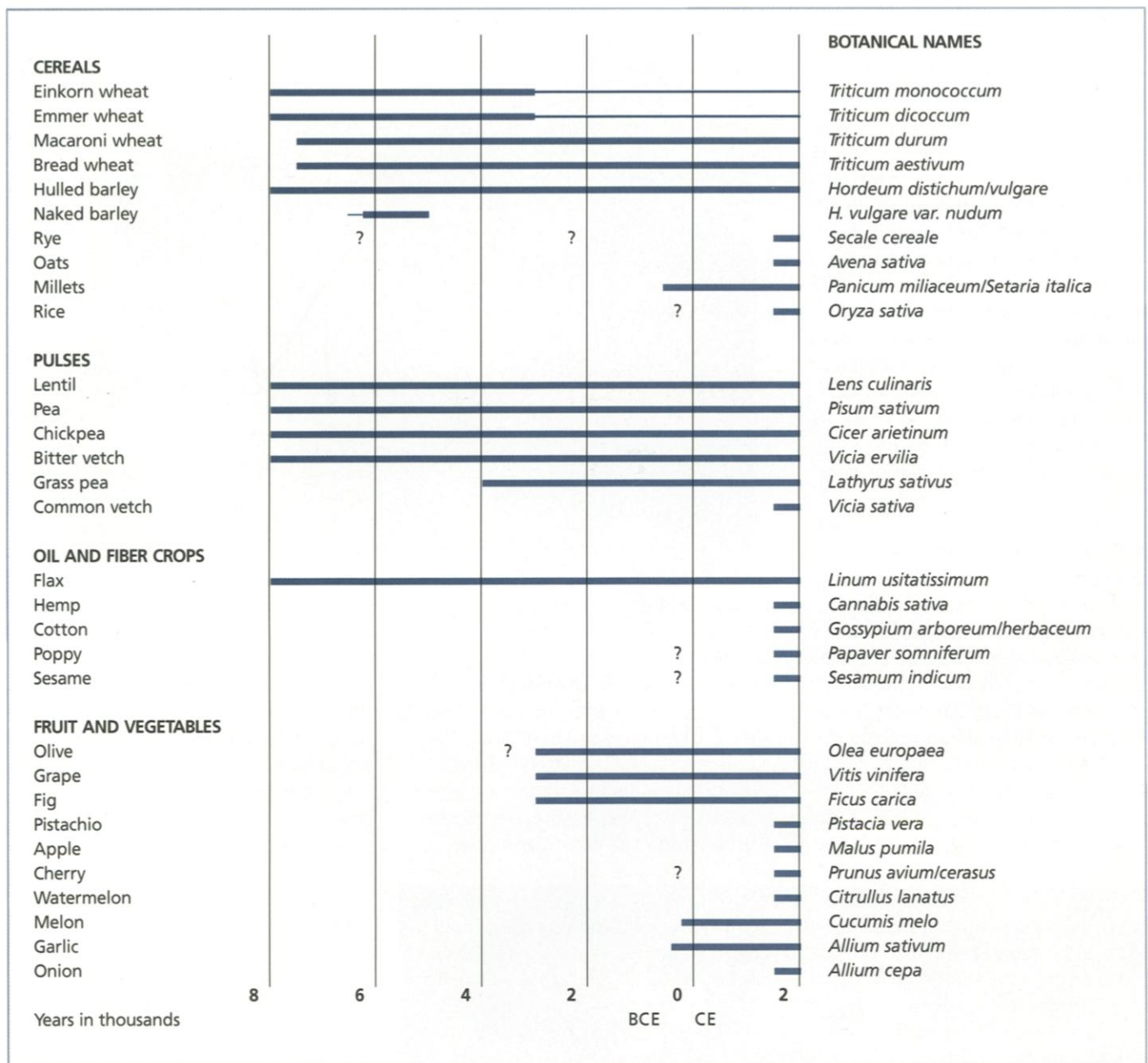
Fortunately emmer and einkorn still grow in a few villages in the lush Pontic mountains of northern Turkey. I was able to travel to the Pontic mountains with Dr. Delwen Samuel, a specialist in the history and use of emmer wheat from Cambridge University, and to talk to farmers with first-hand knowledge of these archaic crops. We found that emmer and einkorn are still grown because they are uniquely resistant to fungal diseases such as stem rust that flourish in the wet, warm summers of the Pontic mountains. Emmer and einkorn are also prized because of their high quality as chicken feed and, for human food, as bulgur, a popular cracked wheat food. However today their area of cultivation is in steep decline, often restricted to one field in a village.

Are there any parallels between this steep decline now and that of the Early Bronze Age? Farmers told us that there were two main reasons why cultivation of bread wheat was increasing at the expense of emmer and einkorn. Firstly, government subsidized fertilizers were available and bread wheat responded better to these. Secondly, grain merchants would buy bread wheat, but were not

interested in minority crops such as emmer and einkorn. Thus, even though bread wheat is susceptible to disease and fared poorly in their fields, it was better integrated into the modern cash economy.

Returning to the Early Bronze Age, in southeast Turkey this period is characterized by a large increase in settlement density and a shift from a landscape of small villages to a more hierarchical system with villages centered on large towns (Whallon 1979). A plausible hypothesis is that increasing demand from a larger, more urban population encouraged farmers to shift production to crops that responded better to increased manuring and which were easier to process once harvested, such as bread wheat and macaroni wheat. Ways of testing this idea are currently being explored, including experimental cultivation of different wheats under different manuring conditions, analysis of weed seeds as indicators of changed husbandry practices, and a search for parallel evidence of intensification in animal husbandry.

Similar large scale changes in settlement patterns and economies over the Near East as a whole may account for the sudden appearance of fruits such as grape and fig as perennial crops at the beginning of the Early Bronze Age (Rivera Nunez and Walker 1989; Runnels and Hansen



Timechart of major crops in Turkey. Thick lines indicate periods of widespread cultivation; thin lines represent cultivation limited to small areas. Question marks indicate likely periods of introduction. It is likely that cultivation of some crops began in the Classical or Byzantine periods, but this cannot be documented owing to lack of archaeobotanical data for these periods.

1986; Stager 1985). For later periods, the sporadic recovery of archaeobotanical material means that patterns are less clear cut. However we have enough data to hint at major changes in agrarian practice: the introduction of summer season crops such as millets in the Iron Age (Nesbitt and Summers 1988); the possible arrival of fruits from further east such as cherry and peach in the classical period; the still unresolved question

of whether such major crops as cotton, rice, and opium poppy were cultivated in Anatolia prior to the Islamic period (Canard 1959; Faroqhi 1979; Watson 1983), and the post-Columbian diffusion of Mesoamerican crops (Andrews 1993). Linking changes in crop species and crop husbandry techniques to the major long-term changes in settlement patterns that can be identified by detailed archaeological surveys (e.g.

Whallon 1979; Wilkinson 1988) is a major opportunity and challenge for archaeobotany.

The great range of topography in Anatolia makes for wide diversity in farming systems, ranging from the classic Mediterranean olive and vine cultivation of the coast, to the wheat and barley fields growing high on the Anatolian plateau (Erinç and Tünçdilek 1952). Much of our archaeobotanical evidence comes from central

and eastern Turkey because that is where most prehistoric excavations have been carried out. As we learn more about ancient farming in western Turkey, with its Aegean contacts, and in regions at lower altitudes, the more diversity in ancient agriculture we can expect to find.

Similar changes have occurred in dietary preferences. Barley is overall the most common cereal in archaeobotanical deposits from Turkey. Today, we think of barley as an animal feed or for malt (Sams 1977), but there is good archaeological evidence for its role as human food. At Sardis and Gordion, pots of barley husks were found amongst the ashes of catastrophically burnt rooms dating to the mid-first millennium BCE.

These are the by-product of making pearl barley by stripping off the grain's siliceous, inedible husks. This tedious dehusking is not necessary for animal feed and must represent preparation of barley for human food. Allied with evidence from classical texts for the importance of barley as a human food, it is likely that ancient barley remains represent human food just as much as ancient wheat.



A Pontic Mountain village, near Kastamonu. A typical landscape of northern Turkey, with village houses constructed of wood. Emmer and einkorn wheats are grown here on an ever decreasing scale.

Barley is sporadically noted as a food in Turkey in the present, but it is unclear when it ceased to be an important food for humans. The pulse group offers two further cases: bitter vetch and grass pea. Both are widely grown today in Turkey as fodder

crops and, as their seeds contain toxins, they are not obvious human foods. Nonetheless, both are abundant in archaeobotanical samples from the Neolithic period onwards and have been found in kitchen contexts. It is highly likely that both were used for food. Provided they are adequately cooked and eaten as part of a mixed diet, both make good foodstuffs (van Zeist 1988). Clearly we must be careful not to project modern ideas of foodstuffs into the past in an uncritical manner.

Fuel

Fuel is an essential commodity for cooking and for heat during the long winter of the Anatolian plateau. Given the role of fire in preserving plant remains, it is not surprising that fuel remains make up a large part of most archaeobotanical samples. A wide range of plant products is still used as fuel in villages today. Where wood is available it is, naturally, the favored fuel (Horne 1982). Strict laws protect Turkey's forests, but brushwood can still be collected, and large areas of eastern Turkey are covered by *enerji orman*



Opium poppy. Still widely grown for morphine around Afyon, in western Turkey, and for poppy seeds all over Turkey. It is still unclear whether this crop plant was grown in Turkey before the Medieval period, although it is common in the Aegean Late Bronze Age.



Piles of dung cakes, on the shores of Lake Van in eastern Turkey. These large stacks are an essential store of fuel for the winter. Archaeobotanical samples from excavation near the village show that dung was in use here in the Early Bronze Age—an indicator of deforestation.

("energy forest"), woodland of oaks coppiced for fuel. Small bushes and other woody plants, such as the tragacanth (*Astragalus*) in the Taurus mountains, are also collected.

However, in large areas of Turkey cutting and grazing have led to extensive deforestation, particularly in areas such as the central Anatolian plateau, where climatic conditions are rigorous (McNeill 1992; Willcox 1974; 1992). In these areas animal dung (Turkish: *tezek*) is an important source of fuel. Dung of domestic animals is collected from stables and fields and buried in pits for several months. Over this time the dung becomes dry and odorless. When it is dug up, it is mixed with water and straw and molded into cakes that can be stacked up for use through the winter months. Dung cakes burn well and cleanly and are a favored fuel.

Today, the use of dung as fuel correlates closely with lack of woodland, and the presence of dung in archaeobotanical samples is therefore a useful indicator of ancient defor-

estation (Miller 1984; 1985; 1990; Miller and Smart 1984). Identification of dung in ancient samples is also important because seeds of grazed plants pass through the animal, end up in the dung and enter the archaeological record as charred seeds. This can contribute a significant number of seeds to archaeobotanical samples and results in a very different seed assemblage from that which is derived from crops and crop-cleaning.

Archaeology and texts: the case of Hittite ZIZ

There is a tendency for archaeologists working in historical periods, for which texts survive, to assume that the written sources already contain all the information they need. This has led to a real neglect of archaeobotanical or zooarchaeological recovery from sites in the Late Bronze Age onwards. Unfortunately, not only do the documents rarely contain the type of information we need for understanding the dy-

namics of farming economies, but translation of terms for crops is highly problematic.

For example, in the Hittite period many tens of thousands of tablets have been excavated at Boğazköy, the Hittite capital. Almost all of these deal with diplomacy, law, religion, or myth. Even if we had perfect understanding of these texts, they would offer us virtually no quantitative information on Hittite agriculture. In any case, translation of the Hittite crop terms has proved almost impossible. Philologists have, however, assumed that Sumerian words used as shorthand by Hittite scribes bore the same meaning as in Mesopotamia.

One of the most frequently used term for a crop is ZIZ, generally translated as emmer wheat in its original Mesopotamian context and assumed to mean the same in the Hittite texts (Gurney 1990; MacQueen 1986). Some years ago Hoffner (1974: 68–69) suggested that archaeobotanical data for the decline of emmer

wheat before the Late Bronze Age meant that *ZIZ* must either refer to bread wheat or be a general term for wheat. Recent archaeobotanical analysis of samples from Kaman Kalehöyük, a Hittite town, confirms that emmer is present only in tiny amounts. Bread wheat is by far the most common wheat, supporting Hoffner's identification (Nesbitt 1993b).

While the Hittite texts do contain some interesting data on crop plants and agricultural techniques, they are best used in combination with archaeobotanical data. Exactly the same point applies to the Classical and Medieval periods (Humphreys 1991:284–308; Sallares 1991; Watson 1983). It is certain that new crops entered Turkey and major agricultural changes occurred, yet these are poorly documented in the historical texts. Only with the inception of the Turkish Republic in 1924 can documentary sources and ethnography be said to replace archaeobotanical data.

Conclusions

Archaeobotanical research in Turkey and the rest of the Near East is at an early stage. The small but ever increasing number of scholars in the field is still working on basic techniques of seed identification and questions of interpretation; few major assemblages of seeds have been recovered and even fewer published. Large-scale recovery programs for plant and animal remains are taking place at a mere seven or eight of the dozens of current excavations in Turkey.

The early stages in the development of a discipline are an exciting time; every fresh bag of plant remains from an excavation is likely to hold important new finds. I have tried to show how archaeobotany can illuminate every period of the human past; whether in prehistory, at the dawn of agriculture, or during the literate civilizations since the development of writing. Successful archaeobotanical analyses depend on a

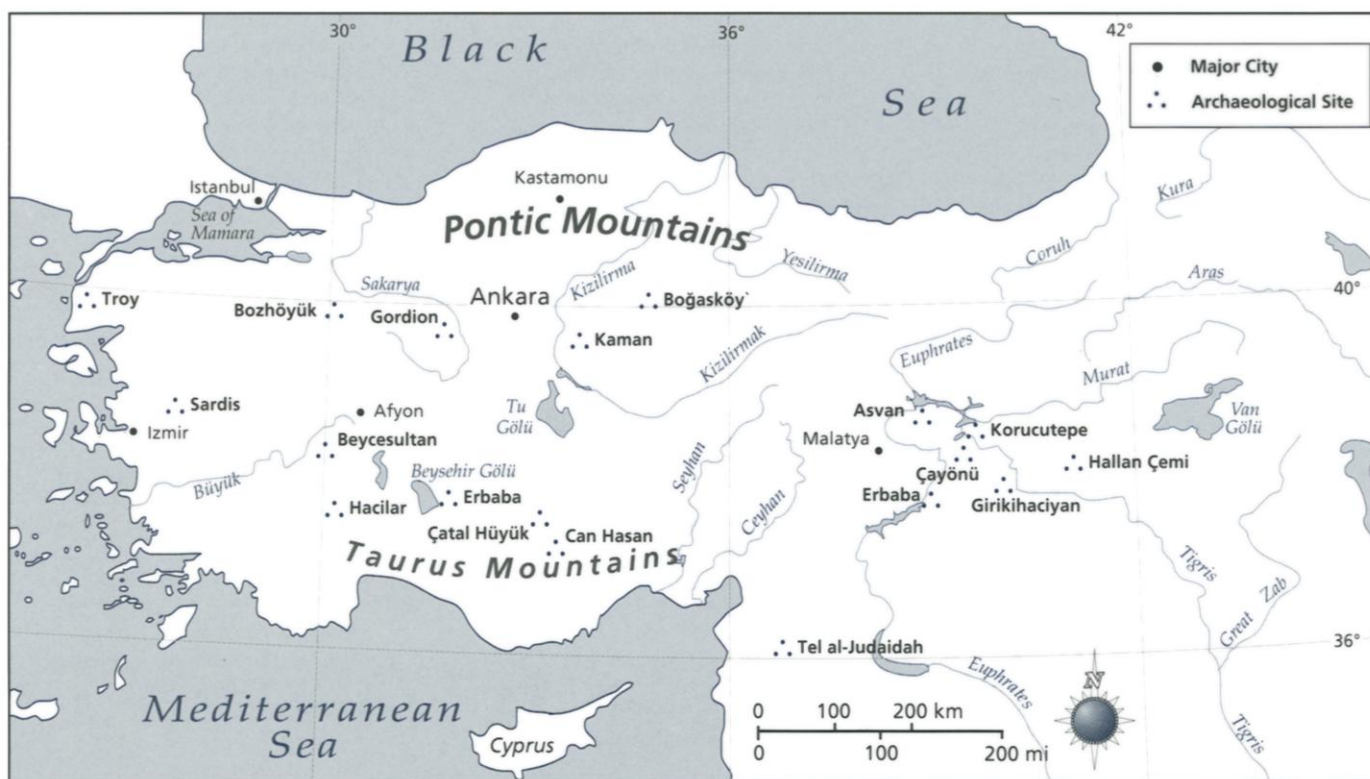


Çayönü, an early agricultural village in southeast Turkey. The large-scale of the famous "cell-plan" buildings is a good indicator of much higher productivity of agriculture compared to foraging. *Photo courtesy of Gordon Hillman.*

wide range of techniques: making decisions about sampling in the field; understanding the modern flora; identifying seeds under the microscope; and carrying out ethnographic work with current day farmers. Most of all, the future of archaeobotany hinges on the use of its ability to address major archaeological questions, as one of a range of techniques on a modern, integrated project.

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AN ETHNOBOTANICAL STUDY IN CENTRAL ANATOLIA (TURKEY)¹

FÜSUN ERTUĞ

Ertuğ, Füsün (Rıdvan Paşa Sok. Refik Bey Apt. 13/14 Göztepe-İstanbul 81080 Turkey). AN ETHNOBOTANICAL STUDY IN CENTRAL ANATOLIA. *Economic Botany* 54(2):155–182, 2000. This study examines both edible plants and non-food uses of plants in a limited area to provide clues for archaeologists, to interpret their findings including the reconstruction of former diets. The results are based on an ethnoarchaeological study conducted in 1994–1995 on the traditional subsistence economy of a contemporary village, in close proximity to a pre-ceramic Neolithic site, Aşıklı, in the Aksaray province of Central Anatolia. As a part of this study, about 600 plant specimens were collected, of which over 300 were considered useful by the villagers. Through this study the floral potential of a limited area, and the richness of the traditional knowledge of plants was documented to provide clues to archaeologists, archaeobotanists, botanists, pharmacologists, economists, and perhaps to the planners of future local development projects.

ORTA ANADOLUDA (TÜRKİYE) BİR ETNOBOTANİK ÇALIŞMASI. Bu çalışmada, arkeologlara karşılaştırma malzemesi sağlamak ve geçmişte yaşamış insanların gıda rejimleriyle yaşam biçimlerini yeniden oluşturabilmelerine yardımcı olmak üzere, bir köyün 'erişim alanı' içindeki yenen ve diğer amaçlarla kullanılan yararlı bitkiler araştırılmıştır. 1994–1995 yıllarında Orta Anadolu'da Aksaray ilinde, çanak-çömlek öncesi Neolitik döneme ait Aşıklı yerleşmesine yakın modern bir köyde geleneksel geçim ekonomisini konu alan bir etnoarkeolojik çalışma gerçekleştirilmiş; bu çalışmanın bir bölümü olarak 600'e yakın bitki örneği toplanmış ve 300'ü aşkın bitkinin köylülerce adlandırıldığı ve çoğunun kullanıldığı saptanmıştır. Bu çalışma, dar bir alandaki bitki kapasitesinin zenginliğini ve bitkilere ilişkin geleneksel bilginin derinliğini göstererek arkeologlara, arkeobotanikçilere, botanikçilere, farmakologlara, ekonomistlere ve belki yerel kalkınma projeleri hazırlayan planlamacılara önemli ipuçları sunmaktadır.

Key Words: ethnobotany; archaeobotany; food and non-food plants; Central Anatolia; Turkey.

The village of Kızılkaya, is located in the Melendiz Plain, which is part of the Central Anatolian Plateau, southeast of Ankara, in the province of Aksaray. The modern town of Aksaray is in the southwest corner of Cappadocia, the ancient name once given to most of Central Anatolia. The population density of the area was 49 per sq km, in contrast to 71.6 per sq km in the national average in 1990. The Melendiz Plain is at an altitude of about 1100 m, and is bordered by a range of volcanic mountains including Melendiz Dağ (2935 m) and Hasan Dağ (3268 m). The Melendiz River waters the plain, and created some deep canyons such as the Peristrema Valley (İhlara), with a different micro climate

and subsequent floral composition. Elsewhere the Melendiz Plain is covered with volcanic soils from lava flows originating from the volcanic activities. The climate is moderate continental, with dry, hot summers and cold winters, with an average annual precipitation of 350 mm. Most of the Aksaray area belongs to the Irano-Turanian floristic region, and is dominated by treeless steppe vegetation.

A Xero-Euxinian vegetation belt once surrounded this steppe vegetation (Zohary 1973). These steppe-forests begin east and south of the research area, where the altitude reaches 1400 m, and its upper limits would be about 2000 m. It includes remnants of the oak forests (dominant *Quercus cerris*; mixed forest of *Q. pubescens*, *Q. infectoria*, *Q. ithaburensis*, a few *Q. trojana*, and *Q. vulcanica* at 2000 m). Most of these oaks have been cut down for fuel, reduced

¹ Received 8 January 1999; accepted 21 September 1999.

TABLE 1. USEFUL SPECIES OF THE MELENDIZ RIVER BASIN, AKSARAY, TURKEY (B 5 PLAN SQUARE).

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
Aceraceae				
<i>Acer hyrcanum</i> Fisch. et Mey. ssp. <i>tauricolum</i> (Boiss. et Bal.) Yalt.	Meşe'/Akçağağ	P	m?/u	526
Amaranthaceae				
<i>Amaranthus retroflexus</i> L.	Pancar otu/Kızıl sirken	L	f	405, 536
Amaryllidaceae				
<i>Galanthus fosteri</i> Baker	Sümbül	F	e	318, 341
Anacardiaceae				
<i>Pistacia atlantica</i> Desf.	Çıtırnik/Menengiç	Fr	f/e	329, 433, 564
<i>Pistacia vera</i> L.	Fıstık/Menengiç*	Fr	f	431, 432, 562-563
Apiaceae				
<i>Anethum graveolens</i> L.	Dereotu*	L	f	559
<i>Astrodaucus orientalis</i> (L.) Drude	Pıtrak otu	P	a	65, 162
<i>Berula erecta</i> (Huds.) Couville	Kazayağı	L	f	224, 315, 504
<i>Caucalis platycarpus</i> L.	Pıtrak otu	P	a	408
<i>Daucus carota</i> L.	Pıtrak otu	P	a	88
<i>Echinophora tenuifolia</i> L. ssp. <i>sibthorpiana</i> (Guss.) Tutin	Çörtük	R/L	f/a	63, 160, 161
<i>Echinophora tournefortii</i> Jaub. et Spach	Dikenli çörtük	P	a	86
<i>Eryngium campestre</i> L. var. <i>virans</i> Link.	Boga diken	S/R	r	576
<i>Orlaya daucooides</i> (L.) Greuter	Pıtrak diken	P	a?	128, 572
<i>Petroselinum crispum</i> (Miller) A.W. Hill	Maydanoz*	L	f	—
<i>Peucedanum palmbioides</i> Boiss.	Pıtrak?	P	a	528
<i>Turgenia latifolia</i> (L.) Hoffm.	Pıtrak diken	P	a	452
Araceae				
<i>Arum</i> sp.	Yiviş	L	f	—
Aristolochiaceae				
<i>Aristolochia maurorum</i> L.	Gavur bostan	Fr	r	48
Asclepiadaceae				
<i>Vincetoxicum fuscatum</i> (Hornem.) Reichb fil.	Gavur üzerliği/ Dag biberi	L	a	165, 523, 547
Asteraceae				
<i>Achillea cf. setacea</i> Waldst. et. Kit.	Yavşan?	L	f?/a	272

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
<i>A. teretifolia</i> Willd.	Dağ kekigi?	L	f/a	522
<i>A. wilhelmii</i> C. Koch	Kokulu ot?	L	f ⁷ /a	422
<i>Anthemis wiedemanniana</i> Fisch. et Mey.	Papatya	P	a	399
<i>Arcium minus</i> (Hill) Bernh. subsp. <i>rubens</i> (Babington) Arenes	Deve pıtırığı	P	a	87
<i>Artemisia santonicum</i> L.	Yavşan	P	a	588, 589
<i>Centaurea depressa</i> Bieb.	Gökçebaş/Gökçebaş	P	a	3
<i>C. iberica</i> Trev. ex Sprengel	Çakıl diken	P	a	69
<i>C. pulchella</i> Ledeb.	Gümiş süpürge otu	P	a/m	510
<i>C. solstitialis</i> L. subsp. <i>solstitialis</i>	Sarıbaş diken	P	a	77
<i>C. virgata</i> Lam.	Acıık otu	L/P	a/u	78, 189
<i>Chondrilla juncea</i> L. var. <i>juncea</i>	Karaavlık	L/R	f/a	74, 308
<i>Cichorium intybus</i> L.	Çitlik/Yabani hindiba	L/R	f/r/a	66, 232, 291-292
<i>C. pumilum</i> Jacq.	Çitlik*	L/R	f	488
<i>Crepis foetida</i> L. subsp. <i>rhoeadifolia</i> (Bieb.) Celak.	Kohum/Koyun otu	L	f/a	79, 309
<i>Echinops pungens</i> Trautv. var. <i>pungens</i>	Kangal diken	S	f/a	575
<i>E. ritro</i> L.	Kangal diken (small)	S/L	a	580
<i>Gundelia tournefortii</i> var. <i>armata</i> L.	Kengel	R	f	—
<i>Helianthus annuus</i> L.	Ayçiçeği*	Se/C	f	—
<i>H. tuberosus</i> L.	Yerelması*	B	f	—
<i>Helichrysum arenarium</i> (L.) Moench.	Püren/Paryavşan	F	f/r/b	166
<i>Jurinea pontica</i> Hausskn. et Freyn ex Hausskn.	Kavkaz otu/Kav otu	L	f	497
<i>Lactuca sativa</i> L. <i>longifolia</i>	Marul*	L	f	—
<i>L. serriola</i> L.	Marul otu/Yazı marulu	L	f/a	2, 317
<i>Picnemon acarna</i> (L.) Cass	Kuşkonmaz diken	F/L	a	277
<i>Scariola viminea</i> (L.) F.W. Schmidt	Kedi çitliği/Çukur çitliği	L	f/a	335, 569
<i>Scorzonera cana</i> (C.A. Meyer) Hoffm. var. <i>radicosa</i> (Boiss.) Chamberlain	Tekercik/Dede sakalı	L	f/a	303, 326, 407, 450
<i>S. mollis</i> Bieb. ssp. <i>szowitzii</i> (DC.) Chamberlain	Bırçalık	B	f/a	38, 483
<i>Sonchus asper</i> (L.) Hill ssp. <i>glaucescens</i> Jordan Ball	Su kangalı	L	f/a	487
<i>Tanacetum aff. parthenium</i> (L.) Schultz Bip.	Saçlı ot	P	a	279
<i>T. argyrophyllum</i> (C. Koch) var. <i>argyrophyllum</i> Tvetzel.	Yavşan	P	a	566
<i>Taraxacum microcephaloides</i> van Soest	Ebem çitliği/Karahindiba	L	f/a	234, 414
<i>T. serotinum</i> (Waldst. et Kit.) Poirat	Çukur çitliği/Çukur otu	L	f/a	353, 568
<i>Tragopogon bupththalmoides</i> (DC.) Boiss.	Yemilik	L	f/a	306, 325, 395, 449
<i>Tripleurospermum decipiens</i> (Fisch. et May.) Bornm.	Sarı papatya	P	a	56
<i>T. monticolum</i> (Boiss. et Huet) Bornm.	Papatya	P	a	340

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
<i>T. parviflorum</i> (Willd.) Pobed.	Kır papatyası	P/F	a	15
<i>Xeranthemum annuum</i> L.	Mor çiçek?	P	a	5
Berberidaceae				
<i>Berberis crataegina</i> DC.	Karamuk çalısı/Sarı ağaç	Fr/R	f/r/m	271, 293, 380
Boraginaceae				
<i>Alkanna cappadocica</i> Boiss. et Bal.	Boya otu	R	m	498
<i>A. pseudotinctoria</i> Hausskn. ex Hub.-Mor.	Kök boya/Karakök	R	m	22
<i>Anchusa azurea</i> Miller var. <i>azurea</i>	Ballık/Çoban çedenesi	F	b	33, 513
<i>A. undulata</i> L. ssp. <i>hybrida</i> (Ten.) Coutinho	Ballık	L	f/a	512
<i>Buglossoides arvensis</i> (L.) Johnston	Beyaz çiçek?	P	a	507
<i>Cerinthe minor</i> L.	Yenir ot?	P	a/f?	493
<i>Echium italicum</i> L.	Kurt kuyruğu	F	a/b	89
<i>Heliotropium lasiocarpum</i> Fisch. et Mey.	Tavuk otu	P	a	1
Brassicaceae				
<i>Aethionema armenum</i> Boiss.	Pembe çiçek ?	P	a	41
<i>Allyssum linifolium</i> Steph. ex Willd.	Sarı çiçek ?	P	a	392
<i>Barbarea plantaginea</i> DC.	Götlez götü	L	f/a	289, 304, 369, 448
<i>Boreava orientalis</i> Jaub. et Spach.	Sarı ot	F	a/b	19
<i>Brassica oleracea</i> var. <i>capitata</i>	Lahana*	L	f/a	—
<i>Camelina hispida</i> Boiss. var. <i>grandiflora</i> (Boiss.) Hedge	Bozot	L	f/a	311, 321, 445
<i>Capella bursa-pastoris</i> (L.) Medik.	Kuşkuş ekmeği	L	f/a	27, 229, 316, 484
<i>Cardaria draba</i> (L.) Desv.	Tirman otu	P	a	391
<i>Descurainia sophia</i> (L.) Webb ex Prantl	Karınca kavağı otu	P	a	16
<i>Eruca sativa</i> Miller (syn. <i>E. cappadocica</i> Reut.)	Izgın	Se	a/r/m	55, 131, 132
<i>Lepidium sativum</i> L.	Acı tere*	L	f/a	376
<i>Rorippa nasturtium aquaticum</i> L. Hayek	Acı tere/Su teresi	L	f	230, 314
<i>Sisymbrium arvensis</i> L.	Hardal otu	L	f/m	58, 156, 312
<i>Sisymbrium altissimum</i> L.	Elgelen hardalı/Ergelen	L	f/a	23
<i>Thlaspi perfoliatum</i> L.	Kalbimsi ot?	P	a	406
Campanulaceae				
<i>Campanula cymbalaria</i> Sm.	Yer otu	L/R	f/a	518
Cannabaceae				
<i>Cannabis sativa</i> L.	Çedene/Hint kenevirini*	Se/S	f/m	67, 126

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
Caprifoliaceae				
<i>Lonicera nummulariifolia</i> Jaub. et Spach.	Kırmızı meyvalı çalı ?	P	e	502
Caryophyllaceae				
<i>Dianthus anatolicus</i> Boiss.	Yabani karanfil	F	e/a	540
<i>D. calocephalus</i> Boiss.	Yabani karanfil	F	e/a	514
<i>D. crinitus</i> Sm. var. <i>crinitus</i>	Yabani karanfil	F	e/a	546
<i>D. zonatus</i> Fenzl var. <i>zonatus</i>	Yabani karanfil	F	e/a	91
<i>Gypsophila eriocalyx</i> Boiss.	Çöğen	P	a/u	61
<i>G. pilosa</i> L.	Yağlıkara otu	P/Se	a/f?	554
<i>Saponaria prostrata</i> Willd. ssp. <i>prostrata</i>	Ebem terliği	L/P	a/s	32
<i>Silene alba</i> (Miller) Krause ssp. <i>divaricata</i> (Reichb.) Walters	Sığır bıcığı	L	a	556B
<i>S. subconica</i> Friv.	Pembe çiçek ?	P	a	401
<i>S. vulgaris</i> (Moench.) Gareke var. <i>vulgaris</i>	Tavşan ekmeği	L	f/a	516
<i>Stellaria media</i> (L.) Vill. ssp. <i>pallida</i> (Dumort.) Aschers. et Graebn.	Haval otu	L	f/a	533
<i>Vaccaria pyramidata</i> Medik. var. <i>grandiflora</i> (Fisch. ex DC.) Cullen	Kıyşayak	P	a	553
Chenopodiaceae				
<i>Beta macrocarpa</i> Stev.	Kızıl pancar	L	f/a	336, 409, 556
<i>B. vulgaris</i> L. ssp. <i>vulgaris</i> var. <i>altissima</i> Döll	Şeker pancarı*	L/B	a/f	120, 560
<i>B. vulgaris</i> L. ssp. <i>vulgaris</i> var. <i>canditima</i> Alef.	Kırmızı pancar*	R/L	f/a	137, 195, 202
<i>Chenopodium album</i> L. ssp. <i>album</i>	Köpürge otu	L	a	403, 486
<i>C. album</i> L. ssp. <i>iranicum</i> Aellen	Sirken otu	P	f/a	334, 410
<i>C. botrys</i> L.	Köpürge otu	P	a	557
<i>Kochia prostrata</i> (L.) Schrad	Zelve otu?	P	a?/m?	587
<i>K. scoparia</i> (L.) Schrad.	Süpürge otu*	P	m	182, 205
<i>Noaea mucronata</i> (Forssk.) Aschers. et Schweinf. ssp. <i>Mucronata</i>	Hölmez diken/Hölmez otu	P	a/u	62, 215
<i>Salsola ruthenica</i> Ijin	Keteğen dikeni/Sıyırma	P	a/u	73
<i>Spinacia oleracea</i> L.	İspanak*	L	f	427, 428
<i>S. tetrandra</i> Stev.	Yazı ispanağı	L	f/a	142, 337, 558
Convolvulaceae				
<i>Convolvulus arvensis</i> L.	Sarmaşık/Yeşil sarmaşık	L	a	50
<i>C. galeaticus</i> Rostan ex Choisy	Sarmaşık/Boz sarmaşık	L	a	49
<i>C. lineatus</i> L.	Tavşan kulağı	L	f/a	404, 446
Corylaceae				
<i>Corylus avellana</i> L.	Fındık	Fr	f	11, 237, 506

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
Crassulaceae				
<i>Sempervivum armenum</i> Boiss. et Huet var. <i>armenum</i>	Musluk otu	L	f	567
<i>Umbilicus erectus</i> DC.	Çanak çatlatan	P	r	534
Cucurbitaceae				
<i>Bryonia multiflora</i> L.	Yabani asma?	L	a	561
<i>Citrullus vulgaris</i> L.	Karpuz/Bostan*	Fr/Se	f/a	—
<i>Cucumis melo</i> L.	Kavun*	Fr	f/a	—
<i>Cucurbita pepo</i> L.	Kabak*	F/Fr/Se	f	—
<i>C. sativus</i> L.	Salatalık/Hıyar*	Fr	f	—
<i>Lagenaria siceraria</i> (Mol.) Standl. ?	Su kabağı	Fr	m	—
Cyperaceae				
<i>Carex divulsa</i> Stokes ssp. <i>divulsa</i>	Saz	L	m?	470
Dipsacaceae				
<i>Scabiosa argentea</i> L.	Süpürge/Yazı süpürgesi	P	m	509
Elaeagnaceae				
<i>Elaeagnus angustifolia</i> L. var. <i>angustifolia</i>	İğde çalısı/Kuş iğdesi	Fr	f/m	52b, 236, 270, 500
<i>E. angustifolia</i> L. var. <i>orientalis</i> (L.) Kuntze	İğde/Has iğde*	Fr	f	52, 222, 269
Equisetaceae				
<i>Equisetum ramosissimum</i> Desf.	Ulama	P	a	233
Euphorbiaceae				
<i>Chrozophora tinctoria</i> (L.) Rafin.	Yalangı ?	R/P	u/m	76
<i>Euphorbia macroclada</i> Boiss.	Sütleğen	L	a/r	235
Fabaceae				
<i>Alhagi pseudolhagi</i> (Bieb.) Desv.	Çoban çalısı	P	a	287
<i>Astragalus elatus</i> Boiss. et Bal.	At keveni	P/R	a/r	548
<i>A. elongatus</i> Willd. subsp. <i>elongatus</i>	Yazı yoncası	P	a/r	28
<i>A. kirscheiricus</i> Chamberlain	Keven/Geven	P/R	u/r/m	191, 223
<i>Cicer arretinum</i> L.	Nohut*	Se/P	f/a	130
<i>Colutea cilicica</i> Boiss. et Bal.	Tavşan patlağı	Se	s	153, 155, 430
<i>Genista sessilifolia</i> DC.	Borcak çalısı	P	u	286, 460
<i>Hedysarum pestalozzae</i> Boiss.	Kıraç yoncası	P	a	83

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
<i>Lathyrus cicera</i> L.	Yazı figi	P	a	25, 53, 412, 424, 550
<i>L. sativus</i> L.	Fig*	P	a	119, 201
<i>Lens culinaris</i> Medik.	Mercimek*	Se/P	f/a	59, 118, 491
<i>Lotus aegaeus</i> (Griss.) Boiss.	Devre otu	P	p	421
<i>Medicago</i> sp.	Yonca*	L	a	—
<i>Melilotus officinalis</i> (L.) Desr.	Yeşek yoncası/Sarı yonca	L	a	80
<i>Onobrychis tournefortii</i> (Willd.) Desv.	Kıraç yoncası	P	a	495
<i>Ononis spinosa</i> L. ssp. <i>leiosperma</i> (Boiss.) Sirj.	Siğek dikenî	P	f/a	70
<i>Phaseolus vulgaris</i> L.	Fasulya/Pakla*	Se/C	f/a	133, 135, 194
<i>Pisum sativum</i> L.	Bezelye*	L	f	—
<i>Robinia pseudoacacia</i> L.	Akasya*	F/P	u/r	144
<i>Sophora japonica</i> L.	Dişbudak*	P	u	219
<i>Trifolium fragiferum</i> L. var. <i>pulchellum</i> Lange	Yonca	P	a	438
<i>Trigonella aurantiaca</i> Boiss.	Üçgül	P	a/r	35
<i>T. coerulescens</i> (Bieb.) Hal.	Devre otu	P	p	384
<i>T. foenum-graecum</i> L.	Çemen otu*	Se	f	299, 511
<i>T. monantha</i> C.A. Meyer	Sarı yonca	P	a	402
<i>Vicia caesarea</i> Boiss. et Ball.	Nohud otu	P	a	34, 157
<i>V. cappadocica</i> Boiss. et Ball.	Fig*/Efeke yoncası	P/Se	a	26, 397
<i>V. cracca</i> L. ssp. <i>stenophylla</i> Vel.	Dağ yoncası	L	a	515, 525
<i>V. ervilia</i> (L.) Willd.	Burçak*	G/C	a	116, 117
<i>V. narborensis</i> L. var. <i>narborensis</i>	Mürdümük otu	Fr	f/a	520
<i>V. sativa</i> L. ssp. <i>nigra</i> (L.) Ehrh. var. <i>segetalis</i> (Thuill.) Ser. ex DC.	Dağ figi	P	a	524
Fagaceae				
<i>Quercus cerris</i> L.	Pelit/Dağ Meşesi	Fr/P	fa/u/m	471, 477
<i>Q. infectoria</i> Olivier ssp. <i>boissieri</i> (Reuter) O. Schwarz	Pelit/Dağ Meşesi	Fr/P	f/u	476
<i>Q. ithaburensis</i> Decne. ssp. <i>macrolepis</i> (Kotschy) Hedge et Yalt.	Pelit/Dağ Meşesi	Fr/P	f/u	457
<i>Q. pubescens</i> Willd.	Pelit/Dağ Meşesi	Fr/P	f/u	439–442, 454–456, 478
<i>Q. robur</i> L. ssp. <i>robur</i>	Pelit/Meşe*	Fr/P	f/a/u	172, 208–210, 352, 453, 473
<i>Q. trojana</i> P.B. Webb	Pelit/Dağ Meşesi	Fr/P	f	443
<i>Q. vulcanica</i> (Boiss. et Heldr. ex) Kotschy	Pelit/Dağ Meşesi	Fr/P	f	527

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
Fumariaceae				
<i>Fumaria vaillantii</i> Luis.	Güvercin göğsü/Şahtere	L	s	20, 366
Geraniaceae				
<i>Erodium cicutarium</i> (L.) L'Herit subsp. <i>cicutarium</i>	İnnelik/İğnelik	L	f/a	228, 294
<i>E. hoefftianum</i> C. A. Meyer	Eşek inneliği	L	a	328, 381
<i>Geranium tuberosum</i> L. ssp. <i>tuberosum</i>	Deve tabanı	B/P	f/a	29
Hydrangeaceae				
<i>Philadelphus coronarius</i> L.	Beyaz çiçekli çalı ?	P	e	501
Illecebraceae				
<i>Herniaria incana</i> Lam.	Köpürgen otu/Sabun otu	P	a/m	494
Iridaceae				
<i>Crocus ancyrensis</i> (Herbert) Maw	Çiğdem/Kırmızı çiğdem	B/F	f	6, 9, 138, 302
<i>Gladiolus atroviolaceus</i> Boiss.	Sümbül	B	f	386
<i>Iris galatica</i> Siehe	Navrağaz	B	f	10, 12, 139, 140
<i>I. germanica</i> L.	Susam/Zambak	F	e	359
Juglandaceae				
<i>Juglans regia</i> L.	Ceviz*	Fr/L/Br	f/r/m	221
Juncaceae				
<i>Juncus inflexus</i> L.	Kova otu	L/S	u/m	71
Lamiaceae				
<i>Acinos rotundifolius</i> Pers.	Yazı irfanı/Reyhan	P	a	383, 398
<i>Ajuga chamaepitys</i> (L.) Schreber ssp. <i>chia</i> (Schreber)	Ebem terliği	L/P	s	17
Arcangeli var. <i>chia</i>				
<i>Ballota larendana</i> Boiss. et Heldr.	Ekmeklik	L	a	545
<i>Lamium amplexicaule</i> L.	Balıbaba	F	b	367
<i>Marrubium parviflorum</i> Fisch. et Mey. ssp. <i>parviflorum</i>	Ak yaprak ?	P	a?	579
<i>M. vulgare</i> L.	Kayışkıran	P	a/u	190, 274
<i>Mentha longifolia</i> (L.) Hutson ssp. <i>typhoides</i> (Brig.) Harley var. <i>typhoides</i>	Yarpuz/Yaban nanesi	L	a/r/m	72
<i>M. piperita</i> L.	Nane*	L	f	—
<i>Ocimum basilicum</i> L.	Reyhan/İrfan*	L	f/a	—
<i>Salvia candidissima</i> Vahl.	Yağlı Börek	S/L	f/a	490

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
<i>S. cryptantha</i> Montbret et Aucher ex Benthham	Adaçayı ?	L/F ?	f?/r/a	46
<i>S. hypargeia</i> Fisch. et Mey.	Çayotu	L/F ?	f/r	40, 489, 583
<i>S. microstegia</i> Boiss. et Bal.	Yağlı Börek	S/L	f/a	531
<i>S. syriaca</i> L.	Çevlik otu ?	P	a?	578
<i>Teucrium polium</i> L.	Acı yavşan ?	P	a?	584
<i>Thymus argaeus</i> Boiss. et Bal.	Kekik	L	f?	521
<i>T. sipyleus</i> Boiss.	Kekik	L	f	496
<i>T. sipyleus</i> Boiss. ssp. <i>rosulans</i> (Borbas) Jalas	Kekik	L	f	451
<i>Wiedemannia orientalis</i> Fisch. et Mey.	Sormuk otu/Balıhbaba	F	f/a	18
Liliaceae				
<i>Allium atrovioleaceum</i> Boiss.	Yabani sarmısak ?	L	f?	51
<i>A. cepa</i> L.	Soğan/Kıska*	B/L	f	127, 187
<i>A. lycanicum</i> Siehe ex Hayek	İt dirseği	P	a	37, 389
<i>A. porrum</i> L.	Pırasa*	L	f	283
<i>A. sativum</i> L.	Sarmısak*	B/L	f	—
<i>A. scorodoprasum</i> L.	İt dirseği/Kaya sarmısığı	P	a	423, 544
<i>Asparagus officinalis</i> L.	İt üzümü	P	a	434
<i>A. persicus</i> Baker	İt üzümü	P	a	180
<i>Colchicum triphyllum</i> G. Kuntze	Oksüz çiğdem/Ak çiğdem	P	a	7, 290, 301
<i>Gagea granatellii</i> (Parl.) Parl.	İt dirseği	P	a	8
<i>Muscari comosum</i> (L.) Miller	Sümbül ?	B	f/e	45
<i>M. neglectum</i> Guss.	İt dirseği	P	a	352
<i>M. tenuiflorum</i> Tausch.	İt dirseği	P	a	437, 532
<i>Ornithogalum pyrenaicum</i> L.	Eşek susamı	P	a/p	43
<i>O. umbellatum</i> L.	İt dirseği	P	a	415
<i>Tulipa armena</i> Boiss. var. <i>lycica</i> (Baker) Marais	Lale (yellow&red)	F	e	344, 354
<i>T. humilis</i> Herbert	Lale (pink)	F	e	13, 345
Linaceae				
<i>Linum mucronatum</i> Bertol ssp. <i>armenum</i> (Bordz.) Davis	Sarı ot?	P	a/m?	39
<i>L. usitatissimum</i> L.	Zeyrek/Zeyrek/Keten*	Se/S	f/a/r/m	124, 125, 300, 542
<i>L. usitatissimum</i> L. var. <i>bienne</i> Mill.	Yabani keten?	P	a	387
Loranthaceae				
<i>Viscum album</i> L. ssp. <i>album</i>	Armut Öveleği/Ökse otu	L	a/r	343

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
Malvaceae				
<i>Alcea apterocarpa</i> (Fenzl.) Boiss.	Devegiliü/Hatmi	F	a/r	64
<i>Aithaea officinalis</i> L.	Hatmi*	F	f	188
<i>Hibiscus esculentus</i> L.	Bamya*	L/F	f/r	—
<i>Malva neglecta</i> Wallr.	Ebengümeci	L/Se	f/a/r	275
<i>M. sylvestris</i> L.	Ebengümeci	L	f/a	535
Moraceae				
<i>Morus alba</i> L.	Dut*	Fr	f	—
<i>M. nigra</i> L.	Dut*	Fr	f	—
<i>M. rubra</i> L.	Dut*	Fr	f	—
Oleaceae				
<i>Fraxinus angustifolia</i> Vahl ssp. <i>angustifolia</i>	Dişbudak*	P	u	145, 220, 475
Orchidaceae				
<i>Orchis palustris</i> Jacq	Yazi susamı	P	e/a	44, 418
Papaveraceae				
<i>Glaucium leiocarpum</i> Boiss.	Gülötu	L	r	54
<i>Hypecoum imberbe</i> Sibth. et Sm.	Navraz otu	L	a	14, 411
<i>Papaver rhoeas</i> L.	Gülötu/Gelincik	L	f/a	332, 419
<i>Roemeria hybrida</i> (L.) DC. ssp. <i>hybrida</i>	Mor gelincik ?	P	a	57
Plantaginaceae				
<i>Plantago lanceolata</i> L.	Boduk kulağı/Sinir otu	L	r	82
<i>P. major</i> L.	Boduk kulağı	L	r	82c
Plumbaginaceae				
<i>Acantholimon kotschyi</i> (Jamb. et Spach) Boiss. ssp. <i>kotschyi</i>	Keven/Geven	P	u/m	84
<i>Plumbago europaea</i> L.	Serkele otu	R/P	m	570
Poaceae				
<i>Aegilops triuncialis</i> L. ssp. <i>triuncialis</i>	Çayır otu	P	g	94, 420
<i>Alopecurus arundinaceus</i> Poiret	Çayır otu	P	a	394
<i>Avena sativa</i> L.	Yulaf*	Se/C	a/r	101, 102
<i>A. sterilis</i> L.	Yabani yulaf	P	a/g	103
<i>Bromus danthoniae</i> Trin.	İbubuk ekini	P	a	96, 463
<i>B. tectorum</i> L.	İbubuk ekini	P	a	464

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
<i>Elymus elongatus</i> (Host) Runemark ssp. <i>turcicus</i> (Mc.Guire) Melderis	Putu otu	P	u	95
<i>E. hispidus</i> (Opiz) Melderis ssp. <i>barbulatus</i> (Schur) Melderis	Ilamuk	P	a	93, 462
<i>E. repens</i> (L.) Gould ssp. <i>repens</i>	Ayrık otu	P	a/u	192
<i>Hordeum bulbosum</i> L.	Yabani arpa/Çavdarcık	P	a/g	466, 467, 519
<i>H. distichon</i> L.	Arpa*	Se/C	f/a/r	106, 114, 121
<i>H. murinum</i> L.	Yabani arpa?	P	a/g	104
<i>H. spontaneum</i> C. Koch	Yabani arpa?	P	a/g	468
<i>Melica ciliata</i> L. ssp. <i>ciliata</i>	Ekinci ot?	P	a	469
<i>Phragmites australis</i> (Cav.) Trin. ex Studel	Kamış/Sokank otu?	S	m	277
<i>Poa bulbosa</i> L.	Çayır otu	P	a	377
<i>Secale cereale</i> L. var. <i>ceriale</i>	Çavdar*	Se/C	f/a	110
<i>S. cereale</i> L. var. <i>vavilovii</i> (Gross.) Meyss.	Çavdar*	Se/C	f/a	108, 111, 461, 465
<i>Triticum aestivum</i> L.	Bugday*/Beyaz Çomak	Se/C	f/a/r	98, 298
<i>T. baotiticum</i> Boiss. ssp. <i>baeoticum</i>	Çavdarcık/Yabani bugday	Se/C	a/g	109
<i>T. durum</i> Desf.	Bugday*/Şahman	Se/C	f/a	97
<i>Zea mays</i> L.	Mısır*	Fr/P	f/a/r/s	136, 186, 268
Polygonaceae				
<i>Polygonum bellardii</i> All.	At mercimeleği	L	f/a	349, 555
<i>P. cognatum</i> Meissn.	Mercimelek/Madımak	L	f/a	284, 327, 333, 385,
<i>P. lapathifolium</i> L.	Mark otu?	P	a	181
<i>P. patulum</i> Bieb.	At mercimeleği	L	a	60, 350
<i>Rumex acetosella</i> L.	Eşkilime/Kuzum oğlağı	L	f/a	382, 417
<i>R. aff. scutatus</i> L.	Eşkilime	L	f/a	276
<i>R. crispus</i> L.	Evelek/Kazan Kulpu	L	f/a/r	81, 435
Portulacaceae				
<i>Portulaca oleracea</i> L. ssp. <i>oleracea</i>	Temizlik/Semizotu	L	f/a	425
<i>P. oleracea</i> L. ssp. <i>sativa</i> (Haw.) Celak.	Temizlik/Semizotu*	P	f	426, 485
Ranunculaceae				
<i>Adonis aestivalis</i> L. ssp. <i>aestivalis</i>	Sakız otu	P	a	24
<i>A. flammea</i> Jacq.	Çanak Çatlatan/Sakız otu	P	a	492
<i>Ceratocephalus falcatus</i> (L.) Pers.	Döğün otu	L/R	r	21, 370
<i>Consolida orientalis</i> (Gay) Schröd.	Şeboy	P	e	42
<i>C. regalis</i> S. F. Gray ssp. <i>paniculata</i> (Host) Soo ssp. var. <i>paniculata</i>	Gelin tacı/Horoz kuyruğu	P	a	4, 159
<i>Nigella arvensis</i> L. var. <i>glauca</i> Boiss.	Çöreotu/Tarla Çöreotu	Se	f?/a/r	90, 552

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
<i>Ranunculus argyreus</i> Boiss.	Yağ kabı ?	P	a?	388
<i>R. isthmicus</i> Boiss.	Sarı su otu ?	P	a?	396
<i>R. repens</i> Boiss.	Yağ kabı ?	P	a?	390
Resedaceae				
<i>Reseda lutea</i> L. var. <i>lutea</i>	Eşek kerdemesi	L	a	365, 447
Rhamnaceae				
<i>Rhamnus oleoides</i> L. ssp. <i>graecus</i> (Boiss. et Reut) Hulmboe	Kızıl üzüm/Kızılcık çalısı	Fr	f	146, 149, 150, 338
Rosaceae				
<i>Amygdalus communis</i> L.	Badem*	Fr	f	330
<i>A. orientalis</i> Miller	Acı badem/Dağ bademi	Fr/P	f/u	30, 322, 458, 459
<i>Armeniaca vulgaris</i> Lam.	Kayısı*	Fr/Br	f/m	297, 313
<i>Cerasus microcarpa</i> (C.A. Meyer) Boiss.	Dağ eriği	Fr?	f?	528
<i>Cotoneaster nummularia</i> Fisch. et Mey.	Kız elması	Fr	f	178, 212, 393, 429
<i>Crataegus meyeri</i> Pojark	Aliç	Fr	f/a	177, 207, 213, 267
<i>C. monogyna</i> Jacq. ssp. <i>monogyna</i>	Öküz götü	Fr	f/a	143, 147, 206, 280
<i>C. sinatica</i> Boiss.	Öküz götü/Aliç	Fr	f/a	174
<i>C. szovitsii</i> Pojark.	Aliç	Fr	f/a	538
<i>Cydonia vulgaris</i> L.	Ayva*	Fr	f/r	—
<i>Fragaria vesca</i> L.	Çilek*	Fr	f	373
<i>Malus sylvestris</i> Miller	Elma*	Fr	f	356, 357
<i>Potentilla recta</i> L. Group B	Sarı çiçek?	P	a	508
<i>Prunus cerasus</i> L.	Vişne	Fr	f	355
<i>P. cocomilia</i> Ten.	Dağ eriği (yellow)	Fr	f/a/r	211
<i>P. divaricata</i> Ledeb. ssp. <i>divaricata</i>	Dağ eriği (yellow)	Fr	f/a	152, 169
<i>P. persica</i> (L.) Batsch.	Şeftali*	Fr	f	358
<i>P. spinosa</i> L. ssp. <i>dasyphylla</i> (Schur) Domin	Dağ eriği (purple)	Fr	f/a	170, 184, 339
<i>P. × domestica</i> L.	Erik*	Fr	f	168, 331
<i>Pyrus communis</i> L.	Armut*	Fr	f	346, 347
<i>P. communis</i> L. ssp. <i>sativa</i> (DC.) Hegi	Armut*/Topuklu armut	Fr	f	342
<i>P. elaeagnifolia</i> Pallas	Ahlat/Dağ Armutu	Fr/P	f/u/e	348, 551
<i>Rosa canina</i> L.	Gülpüntü/Kuşburnu	Fr	f/a/r	175, 185
<i>R. hemisphaerica</i> J. Herrm.	Yabani sarı gül	F	e	436
<i>Rubus sanctus</i> Schreber	Böğürtlen	Fr	f/a/r	176
<i>Sorbus torminalis</i> L.	Kuş üvezi	Fr	f?	444

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
<i>S. umbellata</i> (Desf.) Fritsch	Yabani elma	Fr	f?	530
Rubiaceae				
<i>Galium</i> cf. <i>cornigerum</i> Boiss. et Hausskn.	Top ot ?	P	e	577
<i>Rubia tinctorum</i> L.	Boya kökü/Kökboya	R	m	179, 227, 505
Rutaceae				
<i>Haplophyllum vulcanicum</i> Boiss. et Heldr.	Yabani kekik ?	L?	f	47
Salicaceae				
<i>Populus nigra</i> L. ssp. <i>nigra</i>	Kavak*	P	m/u	204, 372
<i>P. tremula</i> L.	Dağ kavağı/Titre kavağı	P	u	529
<i>Salix alba</i> L.	Söğüt*	P	m/u	203, 371
<i>S. babylonica</i> L.	Salkımsöğüt*	P	e	329
Scrophulariaceae				
<i>Scrophularia libanotica</i> Boiss. subsp. <i>libanotica</i> var. <i>nevsehirensis</i> R. Mill	Kutnu otu	P	r	31, 216, 379
<i>Verbascum lasianthum</i> Boiss. ex Benth	Sığır kuyruğu/Yalangı	P	m	266, 499
<i>Veronica anagallis-aquatica</i> L.	Camak	L	f/a	231, 305
Solanaceae				
<i>Capsicum annum</i> L.	Biber*	Fr	f	—
<i>Datura stramonium</i> L. ?	Mang otu	Se?	s/p	—
<i>Hyoscyamus niger</i> L.	Yılan otu	Se?	p	—
<i>Lycium anatolicum</i> A. Baytop et R. Mill	Beyaz çalı/Termiye çalısı	S	r	36
<i>Lycopersicon esculentum</i> L.	Domates/Firek*	Fr	f	—
<i>Solanum alatum</i> Moench	İt üzümü	P	a	92
<i>S. melongena</i> L.	Patlıcan/Baldırcan*	Fr	f	—
<i>S. tuberosum</i> L.	Patates/Kümpür*	B	f	265
Tamaricaceae				
<i>Tamarix parviflora</i> DC.	Ilgın	P	u/e	400, 481
Thymelaeaceae				
<i>Daphne oleoides</i> Schreber ssp. <i>oleoides</i>	Yaygıç	R/L	r	539
Typhaceae				
<i>Typha laxmannii</i> Lepechin	Hasır otu	P	a/m	85, 278

TABLE 1. CONTINUED.

Family/Species	Local names	Plant part	Use category	Voucher specimen no.
Ulmaceae				
<i>Celtis tournefortii</i> Lam.	Çitlembik/Kılığlı	Fr	f/a	163, 171, 214, 273, 281, 374, 378, 413
<i>Ulmus minor</i> Miller ssp. <i>minor</i>	Karaağaç	P	u/m	218, 310, 319, 375
Urticaceae				
<i>Urtica dioica</i> L.	Cızırgan/İsrgan otu	L	f/r	360, 517
Violaceae				
<i>Viola odorata</i> L.	Menevşe	L/F	a	323
Vitaceae				
<i>Vitis vinifera</i> L.	Asma*	Fr/L	f/m/r	—
Zygophyllaceae				
<i>Peganum harmala</i> L.	Üzerlik	Se/P	m/s/r	167, 482
<i>Tribulus terrestris</i> L.	Çoban çöküren	L	a	75
Fungi				
Agaricaceae				
<i>Agaricus subperonatus</i> (Lange) Sing.	Has mantar	M	f	288
Amanitaceae				
<i>Amanita argentea</i> Huijsman (A. mairei Foley)	Büyük Melek mantarı	M	f	368
Bolbitiaceae				
<i>Agrocybe praecox</i> (Pers.) Fayod	Melek mantarı	M	f	364
Coprinaceae				
<i>Coprinus atramentarius</i> (Bull.) Fr.	Söğüt mantarı	M	f	363
Helvellaceae				
<i>Helvella lacunosa</i> Afz.	Kulak mantarı	M	f	362
Hymenogastraceae				
<i>Rhizopogon obtextus</i> (Spreng.) Rauschert.	Domalan mantarı	M	f	361
Sclerodermataceae				
<i>Scloderma bovista</i> Fr.	Foskulak mantarı	M	r	541

to brushwood, and only *Q. robur* was encouraged by cultivation in gardens for its larger acorns. Neither *Pinus* nor *Juniperus* are represented in the present steppe-forest, but species that originally grew together with *Pinus nigra*, such as *Q. vulcanica*, and *Acer hyrcanum* are still present. There are also some small patches within the volcanic areas, where some wild fruit trees (such as *Crataegus*, *Prunus*, *Pyrus*, and *Amygdalus*) have survived. The rivers and small streams provide moisture for the grazing lands and are the site of some aquatic edible species, such as *Berula erecta*, *Rorippa nasturtium-aquaticum*, and *Veronica anagallis-aquatica*. Some patches of archaic cereals, such as einkorn (*Triticum boeoticum*), and wild barleys (*Hordeum bulbosum*, *H. murinum*, *H. spontaneum*) are also present. It is not surprising that this area with its high ecological diversity attracted and hosted several hunter gatherer groups and was the location of the earliest villages. Today, most of the area is devoted to cereal production, with gardens near the channels or rivers, and some orchards and vineyards, so the anthropogenic landscape is larger than the original steppes.

The village of Kızılkaya is about 25 kilometers southeast of the city of Aksaray, and one kilometer north of the pre-ceramic Neolithic site of Aşıklı Höyük (38° 15' E 38° 22' N), dated from 8000 to 7450 years B.C. (calibrated). A team from the University of Istanbul, under the direction of Dr. U. Esin (1996, 1998) has been excavating this site for the past nine years. The economy of Aşıklı was based on crop husbandry, gathering wild plants (van Zeist and de Roller 1995), and hunting game animals. They were probably in the process of the transition from hunting-gathering to food-producing. My fieldwork (Ertuğ-Yaraş 1997) provided comparative data for the interpretation of the archaeobotanical remains from Aşıklı Höyük, as well as a resource for ethnobotanists, pharmacologists, and

perhaps for the planners of local development projects.

MATERIAL AND METHODS

In the process of documenting all species known to the villagers, some 600 plant specimens in the B5 square of the *Flora of Turkey* grid-system (Davis 1965) were collected. Although this study was mainly in the immediate environment of Kızılkaya, the surrounding area, which extends about 20–25 km around Kızılkaya was also investigated. Kızılkaya proper covers 2047 ha within this core area. It is not possible to identify specific catchment areas for wild plant gathering, as plants were gathered almost anywhere. The plants were collected at an altitude of approximately 1050 to 2000 m. Of the 600 plant specimens, including the cultivars (see Table 1), 340 plant species could be identified to the level of genus or species. They comprise 225 genera and 73 families. Most of the identifications were made in the Department of Biology, Gazi University, Ankara, and the samples were deposited in the Gazi University Herbarium. A file was made, ordered according to the local names of the plants, the Latin names, the information about where each plant was seen, at what altitude, the type of soil, the local use and processing methods, and a photograph was included.

About 30 endemic and rare species were collected during the fieldwork, and a few species such as *Galanthus fosteri*, and *Tulipa armena* were found outside their known distribution areas. The most important information is keyed to about 300 locally-named plants, their distribution, use and management with a collection of corresponding botanical specimens. This information has been confirmed in 14 surrounding villages and towns with about 60 community members in several social categories rich and poor, young and old, men and women.

Questionnaires were completed in Kızılkaya

←

* indicates cultivated taxa; ? Question marks after local names indicate that these names are not used by everyone, and sometimes given arbitrarily. **Plant Parts** B Bulb; Br Bark; C Chaff; F Flower; Fr Fruit; L Leaf; P Whole Plant; R Root; S Stem; Se Seed/Grain.

Use Categories (after Phillips and Meilleur 1998) a animal food (forage, fodder); b bee plants (pollen or nectar sources); e environmental uses (ornamentals, windbreaks etc.); f food (including grains, flowers, tea, etc.); g gene resources; m materials (including lumber, fibre, tannin, resin, wax, oils etc.); p poisons (useful and harmful); r remedies (medicine for both humans and animals); s social products (narcotics, ritual/religious value, used in children games, etc.).

for a randomly chosen sample of 30 households in three income groups concerning land-ownership, agriculture, and about plant gathering and gardening. With these questionnaires the different attitudes of rich and poor towards gathering and/or agricultural decisions were detected. These also helped in the quantification of wild plant use, and for comparisons between different income groups. However, the most satisfactory way to collect information about the plants was to accompany and question the women while they were gathering, as well as attending all agricultural activities, such as planting, weeding, harvesting, processing, and cooking.

THE SUBSISTENCE OF THE MODERN VILLAGE

The contemporary village of Kızılkaya has a population of about 1300 people occupying some 300 houses. Historical tax records for this village and many others in the area go back as far as the sixteenth century, thus they have at least a 500 year history of settlement. The main economic activities are field cropping and gardening, and the husbandry of sheep and cattle (Ertuğ-Yaraş 1997).

The total number of cultivated plants was 70, including 20 trees, 10 fodder plants, of which four species were no longer cultivated, and some cultivars which were planted only rarely. The basic cereal crops were bread wheat, and legumes such as beans, lentil, and chickpea. About 20 vegetables were regularly planted in spring and consumed during the summer. Some were dried, made into paste or pickled, and stored for winter. Onions, potatoes, garlic, green beans, squash, peppers, and tomatoes were the most important. Beet, spinach, cabbage, leek, purslane, green onion, cress, lettuce, parsley, and chicory were regularly planted for the consumption of their green leaves. Whereas the number of cultivated green leafy vegetables did not exceed 10 during the summer, as many as 40 different kinds of wild greens were gathered during the winter and spring. Although the women tried to plant some wild species in their gardens they didn't like the taste. Chicory and wild spinach were the most common of these. Although the women planted commercial seeds of beet and spinach in their gardens, they also collected the wild spinach (*Spinacia tetrandia*) and wild beet (*Beta macrorrhiza*) in winter from fallow fields.

Gardening has gradually increased during the

preceding 20 to 30 years but the climate being continental, the frost starts as early as October, limiting gardening to the summer. Until recently, the last fresh products from the village gardens, such as tomatoes and leeks, were eaten during October. From November until June, a period of seven or eight months, no fresh garden vegetables could be brought to the table. With the use of plastic greenhouses and the increased availability of transportation to markets, fresh vegetables and fruit became available during the whole year. Despite this accessibility, the local traditions of wild plant gathering for food persists in Central Anatolia, and probably goes back at least 500 years.

EDIBLE WILD PLANTS

Over 100 wild plant species in the Melendiz Plain are considered by the local people as edible. These edibles belong to 36 plant families, and 42 wild greens (representing 18 families) make up the group most commonly and regularly consumed, followed by wild fruits, roots, and stems. Species belonging to the Asteraceae and Brassicaceae families are the most numerous among the greens exploited by the villagers. Of the 100 edible species 37 are not reported as edible in the general ethnobotanical literature (Table 2). To be able to tell this the extensive data base of SEPASAL in the Center of Economic Botany, Royal Botanical Gardens, Kew have been searched as well as other local and regional literature. An additional 18 plants available in the Melendiz area, were reported in the literature as edible in other areas, but were not used for food in the study area. Thus the number of possible edible wild greens should be increased to 121. Peddlers and the villagers from neighboring areas, who brought plants to trade may increased this number even more.

Greens

Wild greens were the most consistent component of the local diet, and were regularly gathered between October and June, when fresh greens were most needed. During the winter, unless the snow was deep, it was possible to find green leaves of 13 to 16 different varieties of edible plants. The minimum number of species with edible leaves was 9 in June, and the number reached 33 in April, and 35 in May. Three different kinds of edible aquatic plants could also

TABLE 2. WILD FOOD PLANTS IN AND AROUND THE KIZILKAYA VILLAGE, AKSARAY, TURKEY.

Species	Use frequency	References
EDIBLE GREENS		
<i>Amaranthus retroflexus</i>	xx	Baytop 1994
<i>Anchusa undulata</i> ssp. <i>hybrida</i> **	x	Not reported
<i>Barbarea plantaginea</i>	xxx	Not reported
<i>Berula erecta</i>	xxx	Not reported
<i>Beta macrohiza</i>	xx	Tanaka 1976
<i>Camelina hispida</i> var. <i>grandiflora</i>	xx	Not reported
<i>Campanula cymbalaria</i> **	x	Not reported
<i>Capsella bursa-pastoris</i>	xxx	Baytop 1994; Işık et al. 1995; Grieve 1984; Pieroni 1996
<i>Centaurea depressa</i> **	x	Not reported
<i>Chenopodium album</i> ssp. <i>album</i>	x	!Baytop 1994; Tanaka 1976; Grieve 1984
<i>C. album</i> ssp. <i>iranicum</i>	x	!Baytop 1994; Renfrew 1973
<i>Chondrilla juncea</i> var. <i>junceae</i>	xxx	Baytop 1994; Forbes 1976; Feinbrun & Zohary 1930
<i>Cichorium intybus</i>	xxx	Baytop 1994; Lyle-Kalças 1974; Tanaka 1976; Grieve 1984
<i>Convolvulus lineatus</i>	xx	Not reported
<i>Crepis foetida</i> ssp. <i>rhoadifolia</i>	xxx	Not reported
<i>Erodium cicutarium</i> ssp. <i>cicutarium</i>	xxx	!Lyle-Kalças 1974
<i>Lactuca serriola</i>	xxx	Öztürk and Özçelik 1991; Tanaka 1976
<i>Malva neglecta</i> *	x	Baytop 1994; Işık et al. 1995
<i>M. sylvestris</i> **	x	Baytop 1994; Işık et al. 1995
<i>Ononis spinosa</i> ssp. <i>leiosperma</i>	x	!Tanaka 1976; Öztürk & Özçelik 1991
<i>Papaver rhoeas</i>	xx	Baytop 1994; Lyle-Kalças 1974; Öztürk & Özçelik 1991; Forbes 1976; Feinbrun & Zohary
<i>Polygonum bellardii</i>	x	Not reported
<i>P. cognatum</i>	xx	Baytop 1994; Öztürk & Özçelik 1991
<i>Portulaca oleracea</i> ssp. <i>oleracea</i>	xxx	!Baytop 1994; Öztürk & Özçelik 1991; Tanaka 1976; Zohary 1973; FAO 1988
<i>Rorippa nasturtium-aquaticum</i>	xxx	Baytop 1994; Öztürk & Özçelik 1991; Zohary 1973; Boulos 1985; Işık et al. 1995; Grieve 1984; Gonzalez 1984
<i>Rumex acetosella</i>	x	Baytop 1994; Işık et al. 1995; Öztürk & Özçelik 1991; Tanaka 1976; FAO 1988
<i>R. crispus</i>	x	Baytop 1994; Tanaka 1976; Grieve 1984; FAO 1988; Renfrew 1973
<i>R. scutatus</i>	xx	Baytop 1994; Öztürk & Özçelik 1991; Tanaka 1976
<i>Scariola vimeana</i>	x	Öztürk and Özçelik 1991
<i>Scorzonera cana</i> var. <i>radicosa</i>	xxx	!Baytop 1994; Öztürk and Özçelik 1991; Işık et al. 1995
<i>Sempervivum armenum</i> var. <i>armenum</i> **	x	Baytop 1994
<i>Silene vulgaris</i> var. <i>vulgaris</i> **	xx	Baytop 1994; Forbes 1976; Zohary 1973; Öztürk & Özçelik 1991; Pieroni 1996

TABLE 2. CONTINUED.

Species	Use frequency	References
<i>Sinapis arvensis</i>	xxx	Baytop 1994; Lyle-Kalças 1974; Pieroni 1996
<i>Sisymbrium altissimum</i>	x	Not reported
<i>Sonchus asper</i> ssp. <i>glaucescens</i>	x	!Baytop 1994; Tanaka 1976
<i>Spinacia tetrandra</i>	xx	Tanaka 1976
<i>Stellaria media</i> ssp. <i>pallida</i> **	x	!Baytop 1994; Grieve 1984; Renfrew 1973
<i>Taraxacum microcephaloides</i>	xx	Not reported
<i>T. serotinum</i>	x	Not reported
<i>Tragopogon bupththalmoides</i>	xxx	Baytop 1994
<i>Urtica dioica</i>	x	Baytop 1994; Işık et al. 1995; Öztürk & Özçelik 1991; Tanaka 1976; Grieve 1984
<i>Veronica anagallis-aquatica</i>	xxx	Zohary 1973; Tanaka 1976
BULBS		
<i>Crocus ancyrensis</i>	xxx	Baytop 1994
<i>Gladiolus atroviolaceus</i>	x	Öztürk & Özçelik 1991
<i>Iris galatica</i>	x	Not reported
<i>Muscari comosum</i>	x	Forbes 1976; Pieroni 1996
<i>Scorzonera mollis</i> ssp. <i>szowitzii</i>	x	!Baytop 1994; Öztürk & Özçelik 1991; Feinbrun & Zohary 1930; Tanaka 1976
ROOTS		
<i>Echinophora tenuifolia</i> ssp. <i>sibthorpiana</i>	x	Not reported
<i>Geranium tuberosum</i> ssp. <i>tuberosum</i>	x	!Baytop 1994; Zohary 1973
STEMS		
<i>Echinops pungens</i> var. <i>pungens</i>	x	Baytop 1994; Öztürk & Özçelik 1991
<i>Salvia microstegia</i>	x	Not reported
FLOWERS		
<i>Crocus ancyrensis</i>	x	Not reported
<i>Trigonella aurantiaca</i>	x	Not reported
<i>Wiedemannia orientalis</i>	x	Not reported
TEA PLANTS		
<i>Achillea teretifolia</i>	x	Not reported
<i>Alcea apterocarpa</i>	x	Not reported
<i>Helichrysum arenarium</i>	xx	Baytop 1984
<i>Salvia argeaus</i>	x	Not reported
<i>S. hypargeia</i>	x	Not reported

TABLE 2. CONTINUED.

Species	Use frequency	References
<i>Thymus sipyleus</i> ssp. <i>rosulans</i>	xx	Tabata et al. 1988; !Baytop 1994
<i>Tripleurospermum parviflorum</i>	x	Not reported
SPICES		
<i>Acinos rotundifolius</i>	x	Not reported
<i>Mentha longifolia</i> ssp. <i>typhoides</i> var. <i>typhoides</i>	x	!Baytop 1994; Öztürk & Özçelik 1991; Tabata 1988
SEEDS		
<i>Anchusa azurea</i> var. <i>azurea</i>	x	Not reported
<i>Lathyrus cicera</i>	x	Not reported
<i>Malva neglecta</i>	x	Not reported
<i>Nigella arvensis</i> var. <i>glauca</i>	x	Baytop 1984
<i>Vicia narborensis</i> var. <i>narborensis</i> **	x	Tanaka 1976
<i>V. sativa</i> ssp. <i>nigra</i> var. <i>segetalis</i> **	x	Baytop 1994; Tanaka 1976
WILD FRUITS (fresh)		
<i>Amygdalus orientalis</i>	xx	Baytop 1994; Zohary 1983
<i>Berberis crataegina</i> *	x	Baytop 1994
<i>Celtis tournefortii</i> *	xxx	Baytop 1994; Tanaka 1976; Hooper 1937
<i>Cerasus microcarpa</i> **	x	Baytop 1994
<i>C. vulgaris</i> *	x	Tanaka 1976
<i>Corylus avellana</i>	x	Baytop 1994; Tanaka 1976
<i>Cotoneaster nummularia</i>	x	Baytop 1994; Öztürk & Özçelik 1991
<i>Crataegus meyeri</i>	xx	Not reported
<i>C. monogyna</i> ssp. <i>monogyna</i>	xx	!Baytop 1984; Pieroni 1996
<i>C. sinaica</i>	xx	Not reported
<i>Elaeagnus angustifolia</i> var. <i>angustifolia</i>	x	Tanaka 1976
<i>Pistacia atlantica</i> *	x	Baytop 1994; Tanaka 1976
<i>Prunus cocomilia</i> **	x	Tanaka 1976
<i>P. divaricata</i> ssp. <i>divaricata</i> **	x	Baytop 1994; Öztürk & Özçelik 1991; Tanaka 1976
<i>P. spinosa</i> ssp. <i>dasyphylla</i>	xx	!Baytop 1994; Tanaka 1976
<i>Pyrus elaeagnifolia</i> *	x	Tanaka 1976; Zohary 1973; Boulos 1985
<i>Quercus cerris</i> **	x	Tanaka 1976
<i>Q. infectoria</i> ssp. <i>boissieri</i> **	x	Not reported
<i>Q. ithaburensis</i> ssp. <i>macrolepis</i> **	x	Not reported
<i>Q. pubescens</i> **	x	Not reported

TABLE 2. CONTINUED.

Species	Use frequency	References
<i>Q. robur</i> ssp. <i>robur</i>	xxx	!Tanaka 1976; Grieve 1984
<i>Q. trojana</i> **	x	Not reported
<i>Q. vulcanica</i> **	x	Not reported
<i>Rhamnus oleoides</i> ssp. <i>graecus</i>	x	Not reported
<i>Rosa canina</i>	xx	Baytop 1994; Öztürk 1991
<i>Rubus sanctus</i> *	x	Baytop 1994
<i>Sorbus torminalis</i> **	x	Not reported
<i>S. umbellata</i> **	x	Not reported
MUSHROOMS		
<i>Agaricus subperonatus</i>	xxx	Bon 1987
<i>Agrocybe praecox</i>	xx	Bon 1987; Phillips 1983
<i>Amanita argentea</i> (Syn. <i>A. mairei</i>)	x	Not reported
<i>Coprinus atramentarius</i> *	x	Bon 1987
<i>Helvella lacunosa</i> *	x	Bon 1987; Phillips 1983
<i>Rhizopogon obtextus</i> *	x	Bon 1987

Notes: (*) indicates that it is exist & known as edible, but not consumed by everyone in Kizilkaya; (**) indicates that this edible plant is not known in Kizilkaya, recorded only in mountain villages; Use frequency is an impressionistic and tentative evaluation: x rarely gathered; xx commonly; xxx most commonly gathered and used species, (!) in references indicates that it does not mentioned in ssp./var. level.



Fig. 1. A woman gatherer with an apron full of edible plants, Aksaray, Turkey, 1995.



Fig. 2. A woman gathering greens, note the adze nearby, Aksaray, Turkey, 1994.

be found, even when the ground was covered with snow.

The gathering of leafy plants was exclusively women's work (Fig. 1, 2). They gather in groups and the women were accompanied by their children. Mothers generally took a daughter along to learn the intricacies of gathering. Sometimes groups of young girls went together, but when they came back their bags were always checked by their mothers for inedible plants. The maximum distance the women went for gathering was about one to one- and-a- half kilometers from the village. In general they gathered for about two to three hours, and collected several species of edibles, which their families consumed in three to five days. The women wore aprons (Fig. 1) or brought plastic bags to carry the gathered greens, and had a big knife or adze to dig-up the plants (Fig. 2). A few men, especially those who hunt and fish, also gather some edible plants from time to time. However, it was not customary, and their knowledge of these plants was quite limited in comparison to the women's.

The middle and poorer income women gathered greens more often and less selectively than women with higher incomes, however, about 80% of women in all income groups continued to gather wild plants as food. It was clear that gathering wild greens was more related to nutrition and taste than to economic need. Most wild greens were not considered marketable. In the market of Aksaray, one could rarely see more than a few species of wild greens and mushrooms, but none of the wild fruits, bulbs, or roots were ever for sale.

Gathering was also a means of social activity for women, who took pride in providing food for their families, sharing the plants with their neighbors, and serving them to their guests. Most women considered plant gathering a good occasion to leave the house and to meet with other women.

Most of the greens were eaten raw with salt between folds of flat bread (*yufka*), but some greens required cooking. These were chopped, and cooked together with onions and cracked wheat (bulgur). This was called *cacık*, and was usually eaten with yogurt. A few, such as *Polygonum cognatum*, was sun-dried in the spring and stored for winter.

Nutritional analysis of twelve of the wild greens most commonly consumed, indicates that they were a very good source of raw protein and minerals. Most of them had protein and mineral



Fig. 3. *Iris galatica* (Navrağaz). An endemic plant with an edible bulb.

values as high as cultivated green vegetables, and probably made a significant nutritional contribution to local diets (Ertuğ-Yaraş 1997: Table 22).

Bulbous Plants

Five bulbous plants were considered edible in the area. Three of them belong to the Iridaceae, and *Crocus ancyrensis* was the one most often consumed. It was usually gathered by children and men using a special iron tool, called *Karlanuç*, used primarily for *C. ancyrensis*. This tool had an iron point, and a long wooden handle. *Crocus* flowers and the bulbs were considered a delicacy, and were eaten by everyone from mid February to the end of March. Bulbs

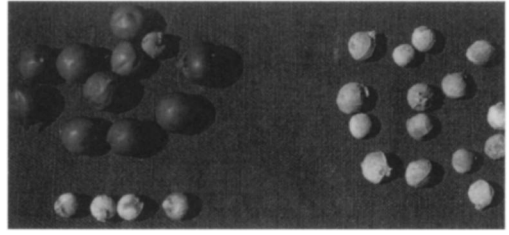


Fig. 4. *Celtis tournefortii* (Çitlembik) stones and fruits. On the left modern fruits and stones, and on the right 9000 year old stones from Aşıklı Höyük.

of other plants, such as endemic *Iris galatica* (Fig. 3), were only sporadically collected.

Mushrooms

Six different species of mushrooms could be gathered during spring and fall. To find mushrooms, young boys dug the soil like moles after every rain. The mushrooms were consumed when fresh, eaten after being roasted with onions and tomatoes, or grilled like meat. None of the species gathered in the area of study were recorded as edible in Turkey, but most of them were recorded in the ethnobotanical literature for Europe.

Fruits

Of the 24 edible wild fruits belonging to eight families, Rosaceae was the family most often consumed. Fifteen of the 28 species were in the Rosaceae, and 7 in the Fagaceae family. None of these fruits had a market value, and were only sporadically gathered for household consumption. If a woman wanted to dry wild fruits such as hawthorn, or plums, she went together with her children, and gathered large quantities.

Among these wild fruits, *Celtis tournefortii* in Ulmaceae (Fig. 4) was particularly important because the stones were found in large quantities in the Aşıklı Höyük excavation, as well as several other Neolithic settlements in Anatolia (Zeist van and de Roller 1995; Helbaek 1964, 1970; Hillman 1972). These *C. tournefortii* stones are identical with those of Aşıklı and probably formed a significant part of the prehistoric diet.

Seven species of oak were documented for the area. Their acorns were edible either fresh or roasted. Fresh acorns were stored in pits covered with earth. If they were bitter, they become sweeter when embedded in the soil for a few

months. Acorns were once a very popular winter food, in addition to hackberries.

MEDICINAL PLANTS

During the study in the Melendiz area, a total of 44 species were recorded (Table 3) as having medicinal use. This included 29 plant families and 11 cultivars. One third of them have not been reported as medicinal in the folk medicine literature of Anatolia. Among these, is a fungus, *Scleroderma bovista* used for human skin wounds, and *Scrophularia libanotica* for hives on skin, while *Aristolachia maurorum* was used for animals, especially for treating wounds of sheep.

Balick and Cox (1996: 70) pointed out that many cultures do not make a clear distinction between food and medicine. There is also a similar overlap between food and medicinal plants used by rural Anatolians. In this study, the ones that the local people gathered as food, were separated from the ones gathered specifically for the treatment of illness. However, when we checked the literature of Anatolian folk medicine, it was clear that many of the common edibles were also recorded as medicinal (Baytop 1984; Fujita et al. 1995; Sezik et al. 1991, 1992, 1997; Tabata et al. 1988). For example, Sezik et al. (1997) refers to *Tragopogon bupthalmoides* as stomachic, and document its use as internal. Similarly Sayar et al. (1995) lists many common species of *Malva* and *Portulaca* as medicinal. In the present study however, because of village usage the same taxa were considered as food plants.

ANIMAL FODDER

Barley, rye, oats, and vetch were cultivated as animal fodder. In addition to those intentionally grown plants, animals grazed about 170 wild species representing 35 different plant families. The fodder plants include 41 species that were also consumed by humans as fresh shoots, before the flowers or seeds appear. Some of these were cut during summer and fall, and stored as winter fodder, such as *Lactuca serriola* and *Sonchus asper*. A few plants were considered harmful to animals, such as *Lotus aegaeus* and *Trigonella coerulescens*, while some others such as *Allium* and *Muscari* species were avoided, because they give the milk an unpleasant taste.

Fodder plants were gathered by women if they were in close proximity to the village, but sometimes they were cut by men with scythes,

and piled in front of the family house. Most women brought an animal load of grasses when returning from the fields or vineyards.

TINDER AND FUEL PLANTS

Dung cakes are the basic fuel throughout Central Anatolia. Seven different varieties of dung were prepared and used in Kızılkaya village (Anderson and Ertuğ-Yaraş 1998). Fifteen species were gathered as tinder for both wood and dung fires (Ertuğ 1998b). *Astragalus*, *Genista* and *Salsola* species were the most commonly gathered tinder plants, *Jurinea pontica* was only used as tinder in an "old fashion" kind of lighter with flint and an iron striker.

Poplar and willow trees were cultivated all over Anatolia for their wood, and for fuel. Oak and elm, before they became scarce were the preferred fuels. In some areas, near the remnants of steppe-forests, people still cut oak trees as fuel. In addition to these trees, shrubs such as *Eleagnus angustifolia*, *Rosa canina*, and *Crataegus* were used as fuel. Branches of grape vines, dry stems and leaves of maize and beans were also used either as fodder or fuel.

The gathering of fuel plants and dung for fuel was done by women near their home, and men sometimes gathered them from a greater distance. Tinder gathering from the gardens, and accumulating it in a corner were also part of women's daily activity during most of the year. Cutting branches, preparing and piling dung-cakes, were done by women during the spring and summer.

PLANTS USED IN HANDICRAFTS

Several plants were used for weaving mats, and to make baskets and brooms. Among those *Phragmites australis* was primarily used to plait mats for the construction of ceilings in village houses (Fig.5). The craft was common in Akhisar. *Typha laxmannii* was used in several ways, as mats for floor covering, containers to carry goods, or as basket-like general purpose containers (Fig. 6). *Juncus inflexus* was widely used to make special containers for linseed oil presses. Brooms were made from six different plants, such as *Centaurea pulchella* or *Chenopodium album*.

Until recently the fibers of hemp, *Cannabis sativa*, in addition to wool, were used in weaving. Several dye plants for wool (17 species, including 7 cultivated plants) should also be in-

TABLE 3. MEDICINAL PLANTS USED IN AND AROUND THE VILLAGE OF KIZILKAYA, AKSARAY, TURKEY.

Species	H.	A.	Parts/application	Related disease in Aksaray area	Reference	Uses given in references
<i>Alcea apterocarpa</i> *	x		Flowers boiled as tea	Coughs	Öztürk & Özçelik 1991	2, 5, 13
<i>Anaranthus retroflexus</i>	x		Whole plant boiled w. others	Sterility	No reference	
<i>Aristolochia maurorum</i>		x	Leaves/roots pounded	Wounds on sheeps' tail	Baytop 1984; Öztürk & Özçelik 1991	5
<i>Astragalus elatus</i> *	x		Roots pounded, boiled w. milk	Stomach pains	No reference	
<i>A. kirshehiricus</i> *	x		Not directly used	Wound at heels	No reference	2, 5, 8, 11, 17
<i>Avena sativa</i> (cultivar)	x		Grains boiled as tea	Good for health	Baytop 1984	2, 3, 14, 11, 15
<i>Berberis crataegina</i>	x	x	Roots boiled as tea, drunk by both humans & sheep	Diabetics & for sheep sickness	Baytop 1984; Fujita et al. 1995	33
<i>Ceratocephalus falcatus</i>	x		Leaves pounded raw & applied	Inflamed wounds	Öztürk & Özçelik 1991	27
<i>Cichorium intybus</i>	x		Roots boiled as tea	Weakness	Baytop 1984;	2, 3, 8, 9, 10, 11, 12
<i>Cydonia vulgaris</i> (cultivar)	x		Leaves boiled as tea	Good for health	Öztürk & Özçelik 1991	6, 7
<i>Daphne oleoides</i> ssp. <i>oleoides</i>	x		Stems with leaves boiled & bathed in its water	Against magic	Baytop 1984	14, 17
<i>Eruca sativa</i> (cultivar)	x		Leaves eaten raw	Epilepsy	Öztürk & Özçelik 1991;	30
<i>Eryngium campestre</i>	x		Leaves & roots applied on boil	Boils & sterility	Fujita et al. 1995	34
<i>Euphorbia macroclada</i>	x		Juice of stems mixed rye flour	Malaria	Baytop 1984	2, 16
<i>Glaucium leiocarpum</i>	x		Leaves pounded, applied wounds	Skin inflammation & on burnt skin	Baytop 1984;	1, 2, 3, 4
<i>Helichrysum arenarium</i>	x		Flowery stems boiled as tea	Stomach pain	Öztürk & Özçelik 1991	5
<i>Hibiscus esculentus</i> (cultivar)	x		Flowers dried & boiled as tea	Shortness of breath	Baytop 1984	8
<i>Hordeum distichon</i> (cultivar)	x		Grains recited -indirect use	Wart	Baytop 1984	2, 12, 13
<i>Juglans regia</i> (cultivar)	x		Leaves boiled, mixed with henna & applied on hair	For mouth and nostril wounds	Baytop 1984	13
<i>Linum usitatissimum</i> (cultivar)	x	x	Seeds roasted & pounded, boiled in milk	Cough, pains	Baytop 1984	1, 5, 8
<i>Lycium anatolicum</i> *	x		Branches & leaves burnt its juice is applied	Skin disease, redness, allergy	Baytop 1984	2, 15
<i>Malva neglecta</i>	x		Leaves boiled or applied raw/drink as tea	Skin, rheumatism & sterility	Baytop 1984	3, 11, 18, 19, 20
<i>Mentha longifolia</i> ssp. <i>typhoides</i>	x		Leaves & stems boiled as tea	Stomach pains	Öztürk & Özçelik 1991 Tabata et al. 1988; Fujita et al. 1995	8, 21, 22 5, 15 1, 6, 22, 29, 31, 32 22

TABLE 3. CONTINUED.

Species	H.	A.	Parts/application	Related disease in Aksaray area	Reference	Uses given in references
<i>Nigella arvensis</i> var. <i>glauca</i>	x		Seeds pounded, eaten w. honey	Stomach pains, ulcer	Baytop 1984	2
<i>Peganum harmala</i>	x		Seeds pounded, eaten w. honey	Stomach pains	Baytop 1984	9, 17, 32, 33
<i>Plantago lanceolata</i>	x		Leaves cut or pounded	Wounds/rheumatism/boils	Baytop 1984	2, 5, 8, 15
<i>P. major</i>	x		Leaves cut or pounded	Wounds/rheumatism	Baytop 1984	2, 5, 8, 15
<i>Prunus cocomilia</i> *		x	Fruits boiled, mash applied	Nipple wounds	No reference	
<i>Reseda lutea</i> var. <i>lutea</i>	x		Bittery roots eaten raw	Stomach pains	Baytop 1984	2, 8
<i>Robinia pseudoacacia</i> (cultivar)	x		Flowers dried & boiled as tea	Good for health	Baytop 1984	12, 17, 18
<i>Rosa canina</i>	x		Fruits boiled as tea	Stomach pains	Baytop 1984	11, 18, 19
<i>Rubus sanctus</i>	x		Roots boiled as tea	Pains, aches	Baytop 1984	2, 5, 11, 18, 19, 20
<i>Rumex crispus</i>	x		Leaves pounded or boiled	Skin wounds & hemorrhoids	Baytop 1984	8, 11, 18, 25, 26
<i>Salvia cryptantha</i> *	x		Flowery stems boiled as tea	Good for health	No reference	
<i>S. hypargeia</i> *	x		Flowery stems boiled as tea	Stomach pains, coughs	No reference	
<i>Scleroderma bovista</i> *			Mushroom itself pounded & applied	Skin wounds, cracks, itch	No reference	
<i>Scrophularia libanotica</i> ssp. <i>libanotica</i> var. <i>nevshirensis</i> *	x		Leaves & stems burnt, its ash mixed w. oil & applied	Inflamed wounds, itch	No reference	
<i>Trigonella auranitiaca</i>	x		Whole plant boiled w. others	Sterility	No reference	
<i>Triticum aestivum</i> or <i>T. durum</i>	x		Grains recited- indirect use	Wart	No reference	
<i>Umbilicus erectus</i>	x		Whole plant boiled w. others	Sterility	Baytop 1984	2, 5
<i>Urtica dioica</i>	x		Leaves applied on skin raw or boiled/used as tea	Rheumatism, pains & sterility	Baytop 1984	2, 3, 25, 27
<i>Viscum album</i> ssp. <i>album</i>	x		Leaves pounded & applied on bite	Snake bites	Fujita et al. 1995	19, 27, 35
<i>Vitis vinifera</i> (cultivar)	x		Leaves used raw	Pain or aches	Fujita et al. 1995	2, 11, 18, 23, 24
<i>Zea mays</i> (cultivar)	x		Stylus is boiled as tea or mash	Hemorrhoid	Baytop 1984	33
					Baytop 1984	5, 18, 28
					Baytop 1984	2, 13

* Endemic plants; (H.) for human treatments; (A.) for animal treatments; Uses given in references: 1. Against cough, 2. Diuretic, 3. Appetizer, 4. Aphrodisiac, 5. Vulnerary, 6. Against asthma, 7. Healing ulcer, 8. Laxative or purgative, 9. Perspirator, 10. Stomachic, 11. Strengthening, 12. Carminative, 13. Against kidney stone, 14. Antipyretic, 15. Expectorant, 16. Stimulatory, 17. Relaxant, 18. Astrigent, 19. Hypoglycaemic, 20. Antiseptic, 21. Against gastrologic infections, 22. Pain reliever, 23. Emetic, 24. Depressor, 25. Depurative, 26. Digestive, 27. Against rheumatism, 28. Styptic, 29. Against cold, 30. Treating animals' broken bones, 31. Against palpitation, 32. Anthelmintic-Vermifuge, 33. Anthelmintic-Vermifuge, 34. Against malaria, 35. Against snake bite.



Fig. 5. Plaiting a reed mat (Tavan hasırı) from *Phragmites australis* (Kamuş) in Akhisar, Aksaray, Turkey.

cluded in this group. A well-known dye-plant, madder, *Rubia tinctorum* was no longer used in the Kızılkaya and surrounding villages, but some other villages in the region collected the roots to sell at the Aksaray carpet market. The red dyed wool used in weaving the famous Taşpınar carpets, was dyed with madder and plants such as *Pistachia lentiscus*, *Plumbago europaea*, and *Verbascum lasianthum* were used to dye various colors. Many of these plants were gathered and processed by women.

Almost all available trees were used as building materials in carpentry, woodwork, furniture making, and utensils. Although wood was scarce in Central Anatolia, more than 70 wooden tools and household items were recorded in one of the villages studied.

OTHER PLANT USES

One wild plant and two cultivated species were used to produce oil for lamps, for food, and for medicinal purposes. These local oil plants were: *Eruca sativa*; *Linum usitatissimum*

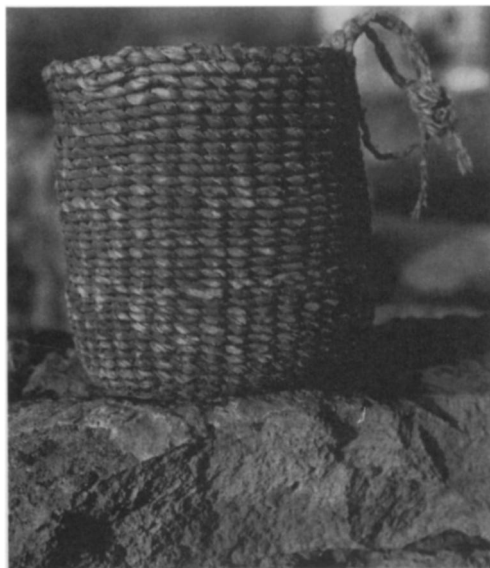


Fig. 6. A basket (Ot sele) made of *Typha laxmanii* (Hasır otu).

and *Sinapis arvensis*. They have been used to produce oil probably from at least the fifteenth century (Ertuğ 1998 a). A variety of plants have been recorded for various purposes, such as: incense and amulets against the evil eye (e.g., *Peganum harmala*, *Nigella arvensis*), glue (e.g., *Astragalus kirscheiricus*, *Acantholimon kotschyi*), gum (e.g., *Chondrilla juncea*, *Gundelia tournefortii*), a tobacco substitute (e.g., *Fumaria vaillantii*), bee plant (e.g., *Anchusa azurea*), a musical instrument (e.g., whistle made of *Salix* branches), and some plants were essential parts of childrens games (e.g., *Saponaria prostrata*, *Ajuga chamaeritys*).

DISCUSSION

Turkey has one of the richest floras in the Near East, with over 10 000 species of vascular plants, and about one third of these are endemic. What we do not know is how many of these are useful. A 12 volume vernacular dictionary of Turkish words provides about 3000 names of plants, which are either considered useful or harmful (Derleme Sözlüğü 1963–1982). The present study indicated that about 300 useful plants were known to local farmers in a limited area of the Melendiz Plain of Central Anatolia, and about 30% of these had not been recorded previously in the scientific literature of Anatolia and the Near East. In a recent study, Fujita et

al. (1995) note that 50% of the medicinal remedies that they recorded in Northern Anatolia, had not been reported in Turkish folk medicine. This, as well as the high number of the unrecorded medicinal plants in the present study shows the amount of work still needed. It also means that potential sources of food, medicine, dyes, and elements possibly useful to industry as well as genetic sources are being neglected.

Some ethnobotanical studies have been published, including the useful plants of Eastern Anatolia studied and published by Öztürk and Özçelik (1991) and wild edible plants sold in Aegean markets by Lyle-Kalças (1974). In addition, several articles have been published recently on the ethnomedicine of Anatolia (Fujita et al. 1995; Sayar et al. 1995; Sezik et al. 1991; Sezik, Zor and Yeşilada 1992; Sezik et al. 1997; Tabata et al. 1994). Further, Baytop's intensive research provided considerable information not only on medicinal but also on edible plants, fodder, fuel, dyes and gums (1984, 1994). However, until this study there was no ethnobotanical research available on the variety of plants used and/or consumed in one limited geographical area of Anatolia. The floral potential of one specific area in Anatolia, and the richness of the traditional knowledge about its plants had not been documented before. Many more detailed studies are needed to obtain a comprehensive picture of plant-human interactions in Turkey.

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ETHNOBOTANCAL STUDIES IN THE VILLAGES OF THE DISTRICT OF ILICA (PROVINCE ERZURUM), TURKEY¹

UFUK ÖZGEN, YUSUF KAYA, AND MAKSUT COŞKUN

Özgen, Ufuk (Atatürk University, Faculty of Pharmacy, Department of Pharmacognosy, 25240 Erzurum, Turkey, e-mail uozgen@atauni.edu), **Yusuf Kaya** (Atatürk University, Science and Art Faculty, Department of Biology, 25240 Erzurum, Turkey), and **Maksut Coşkun** (Ankara University, Faculty of Pharmacy, Department of Pharmaceutical Botany, 06100 Tandoğan, Ankara, Turkey). ETHNOBOTANCAL STUDIES IN THE VILLAGES OF THE DISTRICT OF ILICA (PROVINCE ERZURUM), TURKEY. *Economic Botany* 58(4):691–696, 2004. An ethnobotanical survey was made of the villages of the Ilica District, Erzurum Province, Turkey. The authors interviewed 130 people in 60 villages. The information so obtained was classified according to the use of plants for food, fuel, dye, and construction materials, as well as for miscellaneous uses. All in all, this study revealed 60 plant taxa that were useful to the villagers of this district.

Key Words: Ethnobotany; Erzurum; Turkey; useful plants.

The field of ethnobotany has seen many advancements over the past decade. New methods and theories have been introduced, and more and more attention is being given to the study of cultures in underdeveloped lands. Furthermore, the subject matter has been broadened to include data not only from anthropology and botany, but also from pharmacology and phytochemistry (Cotton 1997).

There are about 9500 species in Turkey, 30% of which are endemic (Davis 1988; Güner et al. 2001). As is the case elsewhere in the world, Turkish people have long utilized plants as remedies, food, fuel, and dye, as well as for furniture, ornamentation, agricultural tools, and construction materials. Ethnobotanical studies have been carried out in Turkey since the early years of the 19th century (Baytop 1984). A bibliography on this subject was published in 1997 by Alpınar and Saçlı. The Turkish Province of Erzurum, in this regard, has been little investigated with regard to its economically important plants (Başar 1972; Öztürk 1988; Sezik et al. 1997). Only two villages of the Ilica District have been previously reported upon (Sezik et al. 1997). Although this study is part of a more comprehensive project that includes all of Erzurum, in this

paper, priority is given to the description of the useful plants of the Ilica District.

STUDY AREA

Erzurum Province, which is located in the East Anatolia subdivision (one of seven subdivisions of Turkey), is comprised of 18 districts. The district that is presented here, Ilica, includes some 60 villages. Its total population was 35 300 in the year 2000. Its area covers 1702 km², and the elevation of its land varies from 1730 to 2300 m. Although the annual mean temperature is 5.9°C, temperatures may vary from –40°C to 34°C, and snow may cover the district from November to April. Distance between villages ranges from 3 km to 85 km. All villages are fairly similar with regard to the level of agricultural development, as well as social and economic life. The main occupations of the villagers are farming, stock breeding, and chicken production.

The Ilica town center includes a sugar mill, a sunflower oil factory, a milk and milk products factory, and many small industrial establishments. None of the villages have any major industrial establishments. Because of the limited opportunities for employment, people often migrate from the smaller villages to the larger towns and cities.

¹ Received 22 November 2002; accepted 15 August 2003.

TABLE 1. THE PLANTS USED AS FOOD IN THE VILLAGES OF İLİCA DISTRICT.

Family and species names	Local name	Parts used	Use application (voucher specimen)
APIACEAE			
<i>Coriandrum sativum</i> L.	Aş otu	Herb	As spice (ATA 9715)
<i>Eryngium billardieri</i> Delar.	Boğa dikenî	Stem	After bark is peeled (ATA 9726)
<i>Eryngium campestre</i> L.	Şeker dikenî	Stem	After bark is peeled (ATA 9705)
<i>Opopanax hispidus</i> (Friv.) Gris.	Kekire	Stem	After bark is peeled (ATA 9693)
<i>Prangos ferulacea</i> (L.) Lindley	Çaşır	Stem	After bark is peeled (AEF 21165)
ASTERACEAE			
<i>Arctium minus</i> (Hill) Bernh. subsp. <i>pubens</i> (Babington) Arénes	Kalağan	Leaves	Cooked (AEF 21191)
<i>Cirsium acaule</i> (L.) Scop.	Zirolük	Stem	After bark is peeled (ATA 9719)
<i>Inula thapsoides</i> (Bieb. ex. Willd. Spreng) subsp. <i>thapsoides</i>	Yıldız kökü	Tuber	Eaten fresh (ATA 9720)
<i>Onopordum acanthium</i> L.	Kavlugan	Stem	After bark is peeled (AEF 21162)
<i>Tragopogon buphtalmoides</i> (DC.) Boiss. var. <i>buphtalmoides</i>	Yemlik	Leaves	Eaten fresh (AEF 21189)
<i>Tragopogon aureus</i> Boiss.	Yemlik	Leaves	Eaten fresh (ATA 9707)
BERBERIDACEAE			
<i>Berberis integerrima</i> Bunge	Kızambuk	Fruit	As pickled (AEF 21164)
<i>Berberis vulgaris</i> L.	Kızambık	Shoot	(ATA 9722)
BRASSICACEAE			
<i>Nasturtium officinale</i> R. Br.	Su teresi	Herb	Eaten fresh (AEF 21158)
<i>Raphanus raphanistrum</i> L.	Mamanik, yaban çeçi	Leaves	Cooked or eaten fresh (AEF 21180)
<i>Sinapis arvensis</i> L.	Mamanik	Herb	Eaten fresh (ATA 9717)
CAPRIFOLIACEAE			
<i>Viburnum lantana</i> L.	Germeşe	Fruit	Eaten fresh (AEF 21178)
CHENOPODIACEAE			
<i>Beta lomatogona</i> Fisch. & Mey. var. <i>lomatogona</i>	Kızılca	Leaves	Cooked (ATA 9709)
<i>Chenopodium foliosum</i> (Moench) Aschers.	İt üzümü	Fruit	Eaten fresh (AEF 21143)
CRASSULACEAE			
<i>Sedum sempervivoides</i> Bieb.	Horozlelesi	Leaves	Eaten fresh (AEF 21141)
<i>Sedum album</i> L.	Gelinparmağı	Leaves	Eaten fresh (ATA 9698)
CUPRESSACEAE			
<i>Juniperus communis</i> L. subsp. <i>alpina</i> (Sm.) Čelak. (= <i>J. communis</i> L. subsp. <i>nana</i> Syme)	Çeçem	Fruit	Eaten fresh (AEF 21145)
ELAEAGNACEAE			
<i>Hippophae rhamnoides</i> L.	Sincan, çalı, karaçalı, ekşi	Fruit	Eaten fresh (AEF 21142)
GROSSULARIACEAE			
<i>Ribes biebersteinii</i> Berl. ex DC.	Üzüm	Fruit	Each fresh or dry (AEF 21152)
IRIDACEAE			
<i>Crocus flavus</i> Weston	Yayla kovan	Whole plant	Eaten fresh (ATA 9727)

TABLE 1. CONTINUED.

Family and species names	Local name	Parts used	Use application (voucher specimen)
LAMIACEAE			
<i>Mentha longifolia</i> (L.) Hudson subsp. <i>longifolia</i>	Yarpuz	Herb	As spice (AEF 21152)
<i>Salvia verticillata</i> L. subsp. <i>verticillata</i>	Dadirek	Stem	Eaten after peeled (ATA 9728)
<i>Thymus fallax</i> Fisch. & Mey. <i>Thymus sipyleus</i> Boiss. Subsp. <i>sipyleus</i> var. <i>sipyleus</i>	Kekik otu Keklik otu	Herb	As spice (ATA 9706, ATA 9718)
MALVACEAE			
<i>Malva neglecta</i> Wallr.	Ebemkömeyi, Ebemköme-ci, Ebemgümeçi	Herb	Eaten fresh or cooked (AEF 21173)
POLYGONACEAE			
<i>Polygonum cognatum</i> Meissn.	Ebemekmeği, Kuşekmeği, Epenek	Leaves	Cooked (AEF 21177)
<i>Rheum ribes</i> L.	İşgin, Eşgin	Stem	After bark is peeled (AEF 21174)
<i>Rumex crispus</i> L.	Evelik	Leaves	Eaten fresh or cooked (AEF 21188)
<i>Rumex scutatus</i> L.	Kuzukulağı	Leaves	Eaten fresh (ATA 9696)
<i>Rumex tuberosus</i> L.	Kuzukulağı	Leaves	Eaten fresh (ATA 9695)
ROSACEAE			
<i>Cotoneaster nummularia</i> Fisch. & Mey.	Koyun gözü, Tavşan el-ması	Fruit	Eaten fresh or dry (ATA 9713)
<i>Crataegus monogyna</i> Jacq.	Alıç	Fruit	Eaten fresh (ATA 9714)
<i>Rosa dumalis</i> Bechst. subsp. <i>boissieri</i> (Crépin) Ö. Nilsson	Kuşburnu	Fruit	Eaten fresh (ATA 9712)
<i>Rosa gallica</i> L.	Kuşburnu	Roots Fruit	As tea Eaten fresh, or in jam or marmalade (AEF 21151)
<i>Rosa pimpinellifolia</i> L.	Koyun gözü, Kara kuşburnu	Fruit	Eaten fresh (AEF 21147)
<i>Rubus idaeus</i> L.	Böğürtlen	Fruit	Eaten fresh (ATA 9711)
URTICACEAE			
<i>Urtica dioica</i> L.	Isırgan	Herb	Cooked (AEF 21172)

METHODS

The study was carried out during 1999–2000, in the period from June through October, when plants were in their flowering and fruiting periods. All villages of Ilica were screened. A questionnaire form, which was prepared before the beginning of the study, was given to our informants. It asked for the person's given name, surname, age, and phone number. It also asked for his or her's knowledge concerning the common names of plants, their usage, and preparation. Information was collected from both the elderly

and the young and from both men and women. The interviews were conducted in group sessions. The species were collected with the help of the informants, and identified in the lab. Voucher specimens of all recorded species were deposited in Ankara Üniversitesi Eczacılık Fakültesi Herbaryumu (AEF) and Atatürk Üniversitesi Fen Fakültesi Herbaryumu (ATA).

RESULTS

One hundred thirty people were interviewed in this study, and 350 voucher specimens were

TABLE 2. THE PLANTS USED AS FUEL IN THE VILLAGES OF ILICA DISTRICT.

Family and species names	Local name	Parts used	Voucher specimen
FABACEAE			
<i>Astragalus barba-jovis</i> DC. var. <i>barba-jovis</i>	Geven	Whole plant	AEF 21197
<i>Astragalus microcephalus</i> Willd.	Geven	Whole plant	AEF 21198
SALICACEAE			
<i>Populus nigra</i> L.	Kavak	Branch	ATA 9716
<i>Salix armenorossica</i> A. Skv. (= <i>Salix viminalis</i> sensu Boiss.)	Söğüt		AEF 21155
<i>Salix cinerea</i> L.			ATA 9699
<i>Salix fragilis</i> L.			ATA 9700
<i>Salix alba</i> L.			ATA 9701
SCROPHULARIACEAE			
<i>Verbascum cherianthifolium</i> Boiss. var. <i>asperulum</i> (Boiss.) Murb.	Sığır kuyruğu Gırç	Stem	AEF 21184
<i>Verbascum cherianthifolium</i> Boiss. var. <i>cataonicum</i> (Hand.-Mazz.) Murb.			AEF 21185
<i>Verbascum cherianthifolium</i> Boiss. var. <i>cherianthifolium</i>			AEF 21187
<i>Verbascum vulcanicum</i> Boiss. & Heldr. var. <i>vulcanicum</i>			AEF 21186

collected. Following the identification of the specimens in the lab, our field collections were found to contain 60 species belonging to 23 plant families. Some of the species were said by our informants to have been used for food, fuel, or dye, while others were said to have served for construction materials or other miscellaneous purposes. All informants were from villages in the Ilica District.

The results of the fieldwork are presented in Tables 1–5. Ethnobotanical uses of plants are given under their family names, in alphabetical order. All species reported in Tables 1–5 were collected from natural habitats rather than cultivated fields, and all are known to have been recently utilized by villagers.

Five species in Table 1 were used for food in

all 60 villages. These are *Malva neglecta* Wallr., *Rosa dumalis* Bechst. subsp. *boissieri* (Crépin) Ö. Nilsson, *Rosa gallica* L., *Rumex crispus* L., and *Urtica dioica* L.

Plant species used for fuel in the 60 villages surveyed included *Astragalus barba-jovis* var. *barba-jovis* and *Populus nigra* L., *Salix armenorossica* A. Skv. (= *Salix viminalis* sensu Boiss.), *Salix cinerea* L., *Salix fragilis* L., *Salix alba* L., *Verbascum cherianthifolium* Boiss. var. *asperulum* (Boiss.) Murb., *V. cherianthifolium* Boiss. var. *cataonicum* (Hand.-Mazz.) Murb., *V. cherianthifolium* Boiss. var. *cherianthifolium*, and *Verbascum vulcanicum* Boiss. & Heldr. var. *vulcanicum*. However, not all of the above species were utilized by all villagers. For example, 24 of the informants in the 60 villages used *Ver-*

TABLE 3. THE PLANTS USED AS DYE IN THE VILLAGES OF ILICA DISTRICT.

Family and species names	Local name	Parts used	Use and application (voucher specimen)
GERANIACEAE			
<i>Geranium tuberosum</i> L. subsp. <i>tuberosum</i>	Potot	Whole plant	It dyes black color (AEF 21150)
RUBIACEAE			
<i>Rubia tinctorum</i> L.	Bostanboyası	Roots	It dyes red color (ATA 9703)

TABLE 4. MISCELLANEOUS USEFUL PLANTS OF THE VILLAGES OF THE ILICA DISTRICT.

Family and species names	Local name	Parts used	Use and application (voucher specimen)
ASTERACEAE			
<i>Artemisia austriaca</i> Jacq.	Yavşan	Whole plant	As a broom (AEF 21139)
<i>Chondrilla juncea</i> L.	Süpürge	Whole plant	As a broom (ATA 9721)
CAPRIFOLIACEAE			
<i>Viburnum lantana</i> L.	Germeşe	Branch	To weave baskets (AEF 21178)
CRASSULACEAE			
<i>Sedum album</i> L.	Gelinparmağı	Whole plant	As an ornament (ATA 9698)
FABACEAE			
<i>Astragalus microcephalus</i> Willd.	Geven	Root	As gum (AEF 21198)
JUNCACEAE			
<i>Juncus articulatus</i> L.	Camış otu	Shoot	To weave hats (ATA 9723, ATA 9724)
<i>Juncus effusus</i> L.			
SALICACEAE			
<i>S. armenorossica</i> A. Skv. (= <i>Salix viminalis</i> sensu Boiss.)	Sorkun	Branch	To weave baskets (AEF 21155)
TYPHACEAE			
<i>Phragmites communis</i> Trin.	Sümbül	Stem	As an ornament (ATA 9704)

bascum spp. for fuel, whereas 30 used *Astragalus* spp., 8 used *Salix* spp., and only 4 used *Populus nigra*.

Two species used as dye plants, *Geranium tuberosum* L. subsp. *tuberosum* and *Rubia tinctorum* L., were reported from only 2 of the 60 villages studied (3.3%).

Several species were recorded as being used for more than one purpose. However, such multipurpose plants were not commonly reported by the villagers. Moreover, the authors were told that the use of such multipurpose plants has decreased markedly in recent years.

Wild plants were not considered to hold the same economic value as cultivated plants in the area studied. Only *Prangos ferulacea* (L.) Lindley, *Rheum ribes* L., *Crataegus monogyna* Jacq., *R. dumalis* subsp. *boissieri*, and *R. gallica* were sold in markets and public bazaars.

TABLE 5. PLANTS USED FOR CONSTRUCTION MATERIAL IN THE VILLAGES OF THE ILICA DISTRICT.

Family and species names	Local name	Parts used	Voucher specimen
SALICACEAE			
<i>Populus nigra</i> L.	Kavak	Stem	ATA 9716

Aside from the wild species reported here, the major food and fodder plants of the Ilica District include wheat (*Triticum aestivum* L.), potato (*Solanum tuberosum* L.), sugar beet (*Beta vulgaris* L. var. *altissima* (Döll) Helm), corn (*Zea mays* L.), sunflower (*Helianthus annuus* L.), rye (*Secale cereale* L.), bean (*Phaseolus vulgaris* L.), lentil (*Lens culinaris* Medik.), carrot (*Daucus carota* L.), spinach (*Spinacia oleracea* L.), onion (*Allium cepa* L.), tomato (*Lycopersicon esculentum* Mill.), eggplant (*Solanum melongena* L.), saint-foin (*Onobrychis viciifolia* Scop.), vetch (*Vicia sativa* L.), alfalfa (*Medicago sativa* L.), and barley (*Hordeum sativum* Pers. (*H. vulgare* L.).

DISCUSSION

Our recorded information was compared with the results of studies by Başar 1972, Baytop 1984, Ertuğ 2000, Öztürk 1988, and Sezik et al. 1997. From Baytop (1984) we found that the local names for most of our species were identical to those used in other Turkish cities. However, some local names were very different from those previously recorded. In fact, some of the plant species recorded by us have vernacular names that represent new records for both the district and the national boundaries of Turkey,

including *Cirsium acaule* (L.) Scop. (Gobuk), *Chondrilla juncea* L. (Süpürge), *Cotoneaster nummularia* Fisch. & Mey. (Koyun gözü), *Geranium tuberosum* L. subsp. *tuberosum* (Potot), *Hippophae rhamnoides* L. (Sincan, çalı, karaçalı, ekşi), *Juncus articulatus* L., *Juncus effusus* L. (Camiş otu), *Juniperus communis* subsp. *alpina* (Sm.) Čelak (Çeçem), *Phragmites communis* Trin. (Sümbül), *Raphanus raphanistrum* L. (Yaban çeçi), *Ribes biebersteinii* Berl. ex DC. (Üzüm), *Rubia tinctorum* (Bostanboyası), *Sinapis arvensis* L. (Mamanik), *Sedum album* L. (Gelinparmağı), *Sedum sempervivoides* Bieb. (Horozlelesi), and *Verbascum* spp. (Gırç).

Of the 60 species that were identified in this study, 42 (70%) were used for food, while 11 (18.3%) were used for fuel, and two were utilized (3.3%) for dye. One species (1.6%) was used for construction material. Nine species (15%) fell under the category of "multipurpose" plants.

The villagers used various parts of the plants for food. Of the 42 food plants that we identified, 12 (28.5%) were utilized by the natives for their fruit; whereas 11 (26%) were utilized for their leaves, 8 (19%) for their stems, and 7 (16.6%) for their edible aerial parts. One species each (2.3%) were used for their edible tubers, roots or shoots, while only one species was consumed whole, i.e., eaten in its entirety.

As pointed out earlier, ethnobotanical studies are becoming more popular throughout the world, and these studies are focused on documenting the traditional uses of plants by native cultures. Unfortunately, native people throughout the world are fast losing some of their most important traditions; and this includes the knowledge of how to recognize and use economically valuable wild plant species. For this

reason, it is important that we collect and record information as soon as possible, and this process should be carried on in as many settings as possible. Not even one village should be neglected, since some information may vary from village to village, even when they are situated very close to one another.

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ETHNOBOTANICAL ASPECTS OF SOME TAXA IN EAST ANATOLIA, TURKEY¹

FEVZİ ÖZGÖKÇE AND HASAN ÖZÇELİK

Özgökçe, Fevzi (Yüzüncü Yıl University, Faculty of Science and Arts, Department of Biology, 65080 Van-Turkey; e-mail: f_ozgokce65@yahoo.com), **Özçelik, Hasan** (Süleyman Demirel University, Faculty of Science and Arts, Department of Biology, 32100 Isparta-Turkey). ETHNOBOTANICAL ASPECTS OF SOME TAXA IN EAST ANATOLIA, TURKEY. *Economic Botany* 58(4):697–704, 2004. This paper presents a list of some medicinal plants distributed in the East Anatolia region. The list was prepared during an ethnobotanical survey of the region from 1995 to 2002. East Anatolia has a rich flora due to its variable climate and its many ecological zones. This diversity in flora provides a rich source of medicinal plants that has been long utilized by Anatolian cultures; and hence, accounts for the remarkable accumulation of medicinal folk knowledge for the region. This paper provides information about 71 useful plants grown in the region, 20 of which are reported for the first time. In addition to the scientific names, vernacular names and medicinal uses are given for each plant.

1995–2002 yılları arası Doğu Anadolu Bölgesinde gerçekleştirilen etnobotanik taramalar sonucu, bölgede yayılış gösteren bazı tıbbi bitkiler bu çalışmada liste halinde verilmiştir. Değişik ekolojik durumlar, farklı iklimsel tipler ve vejetasyon geçmişi nedeniyle Doğu Anadolu Bölgesi zengin bir floraya sahiptir. Farklı kültürlerle ve zengin floraya sahip bölgede Halk hekimliği ile ilgili veriler çok fazladır. Bundan dolayı Anadolu tıbbi bitkilerinin kullanımı bakımından önemli bir merkez olmuştur. Bu araştırmada bölgede yetişen değişik amaçlarla kullanılan 71 faydalı bitki hakkında bilgi verilmektedir. Kaydedilen verilerden 20'si ilk kez sunulmaktadır. Çalışmayı oluşturan bitkilerin tümü araştırma bölgesinden toplanıp teşhis edilmiş, yöresel isimleri ve tıbbi kullanımları verilmektedir.

Key Words: Ethnobotany; vernacular name; East Anatolia; Turkey.

East Anatolia is the largest geographical region of Turkey. Since the area is surrounded by coastal mountain ranges, it is shielded from the moderating effect of sea breezes. For this reason, winters are usually cold and long, and precipitation generally occurs as snow that lasts for several months. After a very short and rainy spring, a hot and dry summer follows (Tabata et al. 1994).

East Anatolia is too large an area to cover thoroughly, so folk remedies in the provinces of Van, Hakkari, Siirt, Batman, Bingöl, Tunceli, Erzurum, Erzincan, Elazığ, Malatya, Ağrı, Kars, Muş, and Bitlis were surveyed.

We concluded that folk medicine is still commonly practiced in East Anatolia because of its geographical remoteness from medical facilities and the difficulty of transportation during the

long, cold winters. These factors explain the preservation of ethnopharmacological practices in the region.

People have been dealing with economically important plants since times immemorial. The large number of research studies we found on medicinal plants is proof of the interest in this type of work. About 800 000 plants are found in the world, with about 9000 of them found in Turkey. Those grown for food number about 3000, but if we consider wild plants used for food, the number increases to about 10 000. According to reports published by the World Health Organization, about 1900 plants are used as drugs; however, nearly 20 000 plants are used for this purpose. Of this larger number, 600 grow in Turkey (Öztürk and Özçelik 1991).

Several studies have been published recently on the ethnomedicine of Anatolia (İlçim and Varol 1996; Özçelik et al. 1990; Öztürk and Özçelik 1991; Sezik et al. 1991; Sezik et al. 1997;

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Tabata et al. 1994; Tonbul and Altan 1989; Yıldırım 1985). Furthermore, Ertuğ 2000 and Baytop's (1984, 1994) intensive research provided considerable information not only on medicinal plants, but also on edible plants, fodder, fuel, dyes, and gums. However, until now there was no ethnobotanical research available on the variety of plants used and consumed in one limited geographical area of Anatolia. The floral potential of one specific area in Anatolia and the richness of the traditional knowledge about plants have never been documented. Many more detailed studies are needed to obtain a comprehensive picture of plant-human interactions in Turkey.

MATERIALS AND METHODS

The study materials consisted of medicinal plant samples, which were collected at various time periods from 1995 to 2002. The plant specimens were assigned collection numbers, and their localities and other necessary field records were recorded. The specimens were pressed, dried according to herbarium techniques, and identified using *Flora of Turkey and the East Aegean Islands* (Davis 1965–1985; Davis et al. 1988; Güner et al. 2000). All plant specimens were kept at the Yüzüncü Yıl University herbarium.

An alphabetical list of the plant taxa, including species and family, is provided in Table 1. The table also lists the plants' vernacular names, localities, plant parts used as a medicine, medicinal use, method of application, and collection number. Ethnobotanical properties of all 71 taxa listed in the manuscript have been confirmed in 48 towns and 15 provinces with populations of approximately 100 community members in several social categories (old and young, rich and poor, women and men). All information was obtained directly by conducting an ethnobotanical survey in the region.

DISCUSSION

Data about the different uses of the 71 taxa were obtained from local people via a survey. Data for about 20 of the 71 taxa are reported for the first time in this article. Data for the other taxa have been reported in different research studies (Baytop 1984; İlçim and Varol 1996; Özçelik et al. 1990; Öztürk and Özçelik 1991; Sezik et al. 1991; Sezik et al. 1997; Tabata et al. 1994; Tonbul and Altan 1989; Yıldırım 1985).

However, the specific uses of the plants and the plant parts used vary in the different regions. Some of the uses are similar to those in our data. The similar use of these plants in different regions is encouraging to people who rely on these plants for ethnobotanical purposes.

Local people of the East Anatolia region have a long history of traditional uses for plants, which was gained through many difficult and painful experiments. This experience can be seen in the use of plants as food, fodder, spices, traditional medicine, ornamentals, and handicrafts. Although traditional medicine is still widely practiced throughout the region, it is being rapidly replaced by modern medicine and pharmaceuticals. Lately, the fear of losing their cultural heritage has prompted people in the region to produce medicinal plants. This effort is outlined briefly.

Most of the medicinal plants are stored under dry conditions to allow use throughout the year. For this reason, the plant parts being used sometimes change according to the seasons and medical purposes.

The primary use of folk remedies is for skin problems, including wounds, abscesses, eczema, and bleeding. The second most frequent use is to treat gastrointestinal disorders, including stomach ache, ulcers, diarrhea, hemorrhoids, and respiratory ailments (e.g., the common cold, cough, and bronchitis).

For skin problems, either fresh or dried plant parts are applied to the skin directly in the form of an ointment or decoction. The bruised leaves of appropriate plants are applied to the skin and must be changed frequently. Remedies for gastrointestinal disorders are generally taken orally, either by drinking decoctions or by eating fresh or dried parts of the appropriate plants. Survey informants stated that latex obtained from various parts of the plants had several different effects. For this reason, latex was often used to treat medical problems. In the summer, people in the region usually put one or two drops of latex on each lump of sugar and store the treated sugar lumps for use in the winter.

The folk remedies used to treat respiratory tract disorders (e.g., cough, sore throat, bronchitis, tonsillitis, cold, and flu) are generally administered by drinking a decoction, but sometimes they are administered by gargling or bathing. However, for the treatment of sinusitis, a juice (obtained by squeezing the roots of herbs)

TABLE 1. FOLK REMEDIES OF EAST ANATOLIA.

Family/Species	Vernacular name	Locality	Plant part	Use	Method of use	Collection no.
Amaranthaceae						
<i>Amaranthus retroflexus</i> L.	Horoz ibi-ği	5, 19, 40	LF	For sterility	Inf (int)	F 5289
Anacardiaceae						
<i>Pistacia terebinthus</i> L.	Menengiç	7, 45	FR	For cold and flu; as diuretic	Dec(int)	F 10 100
Apiaceae						
<i>Eryngium billardieri</i> Delar	Tüsü	2, 48	RT	For sinusitis, catarrh	Fresh, pounded, juice (gt; sniffed)	F 6186
		17, 42 34, 39	HB RT*	For wounds For smoking cessation	Powder (ext) + Tobacco (cigarette)	
<i>Ferula haussknechtii</i> Wolff ex Rech. fil.	Heliz	1, 10, 14	RT	As additive for herbal cheese	Fresh	F 5010
<i>Heracleum crenatifolium</i> Boiss.	Sov	3, 16, 34	SH	As vegetable and condiment	Fresh	F 3432
Araceae						
<i>Arum dentrucatum</i> C. A. Mey. ex Schott var. <i>videscens</i> (Stapf.) K. Alpınar & Miller	Karibel	6, 9	RT*	For diabetes	Dec (int)	F 2796
Asclepidaceae						
<i>Vincetoxicum canescens</i> (Willd.) Decne. subsp. <i>canescens</i>	Zilasur	10, 17, 46	BO	For scabies	Pounded (ext)	F 5675
Asteraceae						
<i>Achillea millefolium</i> L. Subsp. <i>millefolium</i>	Civan per-çemi	20, 32, 41	FL	As diuretic, urinary antiseptic	Dec (int)	F 5110
<i>A. vermicularis</i> Trin	Civan per-çemi	4, 22, 37	HB*	For swelling of stomach (children)	Dec (int)	F 5656
<i>Anthemis nobilis</i> L.	Sarı papatya	12, 27, 28	FL	As diuretic, for stomach ache	Inf (int) Tea	F 2990
<i>Arctium minus</i> Bernh. subsp. <i>pubens</i> L.	Top telli	7, 13, 23	FL	For eye diseases	Red parts pounded (gt)	F 8740
<i>A. tomentosum</i> Miller var. <i>glabrum</i> (Körnicke) Arenes	Top telli	15, 27, 47	LF	For swelling of stomach	+ Milk, boiled (ext)	F 8730
		9, 21, 47	RT	For abscesses	+ Milk, pounded, (ext)	
<i>Bellis perennis</i> L.	Koyun gözü	24, 30, 43	FL	For diarrhea; as diuretic, purgative	Inf (int)	F 5348
<i>Carthamus tinctorius</i> L.	Aspir	8, 26, 29	FL	As a dye in cosmetics and food	Boiled	F 4032

TABLE 1. CONTINUED.

Family/Species	Vernacular name	Locality	Plant part	Use	Method of use	Collection no.
<i>Cichorium intybus</i> L.	Talışk	3, 46, 47	RT	For epilepsy (3 days)	Boiled for long time (int)	F 1501
<i>Gundelia tournefortii</i> L. var. <i>tournefortii</i>	Kenger	9, 46 48	SD*	For vitiligo	Coffee	F 2888
<i>Helichrysum plicatum</i> DC subsp. <i>plicatum</i>	Herdem-taze	All localities	SH	For kidney stones	Inf (int)	F 2757
		All localities	FL	For kidney stones		
<i>Inula helenium</i> L. subsp. <i>pseudohelenium</i> Grierson	Andız	3, 35	RT	For relaxing of chest pain	Inf (int)	F 2556
<i>Scorzonera latifolia</i> L.	Kanok	5, 11, 31	RT	For sterility	Gum (ext)	F 6100
Berberidaceae						
<i>Berberis vulgaris</i> L.	Karamuk	15,18,45	RT	For jaundice in animals	(Int; by licking)	F 8337
<i>Leontice leontopetalum</i> L. subsp. <i>ewersmannii</i> (Bunge) Coode	Kırkbaş otu	14, 39, 46	RT*	For epilepsy	Dec (int)	F 2830
Boraginaceae						
<i>Alkanna orientalis</i> (L.) Boiss. var. <i>orientalis</i>	Havacıva otu	16, 33, 42	RT	For wounds	+ Better; ointment (ext)	F 5353
<i>Echium italicum</i> L.	Deve dilli	8,19,36	RT	For wounds	+ Butter (ext)	F 3847
Brassicaceae						
<i>Lepidium latifolium</i> L.	Nujdar	16, 23	LF	For wounds	Powder (ext)	F 541
Caryophyllaceae						
<i>Telephium imperati</i> L. subsp. <i>orientale</i> (Boiss.) Nyman	Mayasıl otu	2, 9, 10	LF*	For hemorrhoids	Boiled (ext)	F 8561
Crassulaceae						
<i>Umblicus erectus</i> DC		38, 45	RT	For sterility	Whole plant boiled (int)	F 10 094
Cupressaceae						
<i>Juniperus oxycedrus</i> L.	Dikenli ardiç	7, 46	FR	For rheumatism	Dec (ext; bath)	F 10 110
Cyperaceae						
<i>Cyperus rotundus</i> L.	Topalak	2, 40, 48	RT*	As a diuretic	Inf (int)	F 10 107
Equisetaceae						
<i>Equisetum arvense</i> L.	At kuyruğu	All localities	HB	As a diuretic	Inf (int)	F 4255
Euphorbiaceae						
<i>Euphorbia heteradena</i> Jaub. & Spach	Sütleşen	13, 38 41	LX	For constipation	Middle part of plant	F 6168
Fabaceae						
<i>Astragalus</i> sp.	Arap zamkı	1, 10, 44	GM	As fire wood; for producing gum tragacanth	Gum	F 8500
<i>Glycyrrhiza glabra</i> L.	Meyan	6, 22, 24	RT	For cough, bronchitis	Dec (int)	F 9865

TABLE 1. CONTINUED.

Family/Species	Vernacular name	Locality	Plant part	Use	Method of use	Collection no.
<i>Trigonella foenum-graecum</i> L.	Pıltan	7, 11, 23	SD	As hypoglycemic	Pounded or dec (int)	F 2468
Globulariaceae						
<i>Globularia trichosantha</i> Fisch. & Mey.	Ahu	45, 46, 47	LF*	For parasites	Inf (int)	F 5299
Hypericaceae						
<i>Hypericum perforatum</i> L.	Binbir delikotu	11, 17, 37	HB*	For stomach ache	Dec (int)	F 5893
Juglandaceae						
<i>Juglans regia</i> L.	Ceviz	39, 40, 43	LF	For bleeding	Fresh, pounded (ext)	F 8759
		1, 13, 47	FR	As promoter of maturation of abscess	Fresh, poultice (ext)	
		1, 9, 48	BR	For wounds	Pounded (ext)	
		1	CO*	As hypoglycemic	Pounded or dec (int)	
Lamiaceae						
<i>Mentha longifolia</i> (L.) Hudson subsp. <i>longifolia</i>	Tüylü nane	16, 28, 39	LF	For cold and flu	Dec (ext; bath)	F 1390
		33, 43, 48		For heart palpitations; catarrh	Dec (int)	
<i>M. pulegium</i> L.	Nane	33, 42	HB + FL	For gall bladder disorders	Dec (int)	F 5888
<i>Origanum majorana</i> L.	Mercan-köşk	9, 10, 11	ST*	As sedative or diaphoretic; for stomach ache	Fresh (int; eaten)	F 5684
<i>O. vulgare</i> L. subsp. <i>gracile</i> (C. Koch) letswaart	Catır	15, 18, 36	HB	For wounds, stomach ache	Dec (int) Dec (int)	F 3224
<i>Salvia verticillata</i> L. subsp. <i>verticillata</i>	Ada çayı	22, 23, 43	LF	For catarrh, common cold	Dec (int)	F 2806
<i>Teucrium chamaedrys</i> L. subsp. <i>sinuatum</i> (Celak) Rech. fil.	Derman	10, 14, 42	HB	For stomach ache	Dec (int)	F 1158
<i>T. polium</i> L.	Beyaz ot	3, 34–37, 48	ST	For stomach ache	Fresh (int; eaten)	F 4143
<i>Thymbra spicata</i> L.	Zahter	2, 7, 8	HB	As antiseptic	Dec (int)	F 6327
Liliaceae						
<i>Merendera trigyna</i> (Steven ex Adam) Stapf.	Gül falcı	1, 44	BU*	For rheumatitis	(int; eaten)	F 5702
Malvaceae						
<i>Alcea calvertii</i> (Boiss.) Boiss.	Hıra çiçeği	4–6, 12, 33	RT	For kidney stones	Inf (int)	F 6586

TABLE 1. CONTINUED.

Family/Species	Vernacular name	Locality	Plant part	Use	Method of use	Collection no.
<i>A. setosa</i> Alef.	Hatmi	21-25, 39, 43	LF	As expectorant, diuretic, emollient	Inf (int)	F 4010
<i>A. fasciculiflora</i> Zohary	Hatmi	15, 25, 38	RT	For passing of kidney stones	Dec (int)	F 8880
		2, 10	RT*	For abscesses, itching of scabies	Residue (ext)	F 7565
<i>Althaea officinalis</i> L.	Hatmi	5, 12, 32, 40	HB	As diuretic, antilithic	Inf (int)	F 4498
<i>Malva neglecta</i> Wallr.	Ebegü-meci	All localities	LF	As promoter of maturation of abscess	Poultice (ext)	F 3562
Plantaginaceae						
<i>Plantago atrata</i> Hoppe	Sinir otu	All localities	LF	For wounds	Fresh (ext)	F 4060
<i>P. lanceolata</i> L.	Sinir otu	All localities	LF	For wounds	Fresh (ext)	F 8287
<i>P. major</i> L. susp. <i>major</i>	Boğa ya-prağı	All localities	LF	For wounds	Dried (ext)	F 6256
		All localities	LF	As promoter of maturation of abscess	Fress (ext)	
<i>P. maritima</i> L.	Yılan dili	8, 10, 11	LF*	As wash for cancerous uterus	Dec (int)	F 4640
Poaceae						
<i>Zea mays</i> L.	Mısır	All localities	SI	As antilithic, diuretic; for hemorrhoids	Inf (int)	F 7978
Polygonaceae						
<i>Rheum ribes</i> L.	Işkin/Ribes	9, 11, 46	RT*	For diabetes, ulcer, diarrhea; as anthelmintic	Dec (int)	F 4832
		3, 6, 44	SD	For diarrhea	Dec (int)	
		4, 5, 16, 35	SH	For hemorrhoids	Dec (int)	
		9, 11, 13 45, 46	SB LF	For digestion For stomach disorders	(Int; eaten) (Int; eaten)	
<i>Rumex crispus</i> L.	Kuzu kulağı	15, 33, 43	LF	For hemorrhoids; as anti-inflammatory, antiphlogistic, antirheumatic	Pounded (ext)	F 8866
Rosaceae						
<i>Crataegus monogyna</i> Jacq.	Alıç	10, 15, 23, 35	FR	As sedative, antispasmodic	(Int; eaten)	F 5897

TABLE 1. CONTINUED.

Family/Species	Vernacular name	Locality	Plant part	Use	Method of use	Collection no.
<i>Rosa canina</i> L.	Gül/Şılan	5, 12, 20, 41	FR	For he- morrh- oids, cough, stomach ache	Stewed (int)	F 6545
Ranunculaceae						
<i>Nigella segetalis</i> Bieb.	Çörekotu	All localities	SD	For diabetes, ulcers	Dec (int)	F 7179
Resedaceae						
<i>Reseda lutea</i> L. var <i>lutea</i>	Muhabet çiçeği	12, 13, 39, 30	RT	For stomach pains	(Int; eaten)	F 4486
Rubiaceae						
<i>Galium verum</i> L. subsp. <i>glabrescens</i> Ehrend.	Yoğurt otu	32, 36, 39	FL*	For all can- cers	Powder (int; eaten)	F 6182
Scrophulariaceae						
<i>Scrophularia libanoti- ca</i> Boiss. var. <i>urar- tuensis</i> R. Mill.	Süpürge otu	2, 5	LF*	For inflamed wounds	(Ext; ap- plied)	F 3563
Solanaceae						
<i>Hyoscyamus niger</i> L.	Ban otu	1, 8, 14, 23	SD	For tooth- ache, tooth cavity	(Inhaled)	F 5879
<i>H. reticulatus</i> L.	Dağdoğan	All localities	RT + SD	For intoxica- tion	(Eaten)	F 4408
Urticaceae						
<i>Urtica dioica</i> L.	Isırgan otu	2, 4, 39, 44	HB*	For all can- cers	Fresh (eaten)	F 5157
		All localities	HB	For rheumat- ic pain	Fresh (eaten)	
<i>U. urens</i> L.	Isırgan otu	4, 16–19, 29	LF	For diarrhea	Tea (int)	F 5040
		All localities	LF	As diuretic	Tea (int)	
Valerianaceae						
<i>Valeriana alliariifolia</i> Adams	Kediotu	2, 20, 28, 44	RT*	As sedative, antispas- modic	Tea (int)	F 8300
Zygophyllaceae						
<i>Peganum harmala</i> L.	Üzerlik	All localities	RT	For hemor- rhoids	Dec (int)	F 5056
		3, 11, 30, 45	SD	For prostati- tis, urinary inconti- nence		

Locality: 1. Van, Bahçesaray; 2. Van, Özalp; 3. Van, Erciş; 4. Van, Muradiye; 5. Van, Çaldıran; 6. Van, Başkale; 7. Van, Gevaş; 8. Hakkari, Yüksekova; 9. Hakkari, Çukurca; 10. Hakkari, Şemdinli; 11. Siirt, Pervari; 12. Siirt, Erüh; 13. Siirt, Baykan; 14. Batman, Sason; 15. Bingöl, Solhan; 16. Bingöl, Yayladere; 17. Bingöl, Karhova; 18. Tunceli, Pertek; 19. Tunceli, Pülümür; 20. Erzurum, Horasan; 21. Erzurum, Tortum; 22. Erzurum, Pasinler; 23. Erzurum, Çat; 24. Erzurum, Tekman; 25. Erzurum, Hınıs; 26. Erzurum, Karayazı; 27. Erzincan, Tercan; 28. Erzincan, Kemah; 29. Elazığ, Palu; 30. Elazığ, Kovancılar; 31. Elazığ, Karakoçan; 32. Malatya, Darende; 33. Malatya, Pütüğe; 34. Ağrı, Doğubeyazıt; 35. Ağrı, Tutak; 36. Ağrı, Diyadin; 37. Ağrı, Hamur; 38. Kars, Sarıkamış; 39. Kars, Digor; 40. Kars, Akyaka; 41. Muş, Malazgirt; 42. Muş, Bulanık; 43. Muş, Varto; 44. Bitlis, Hizan; 45. Bitlis, Mutki; 46. Bitlis, Tatvan; 47. Bitlis, Adilcevaz; 48. Bitlis, Ahlat.

Abbreviations: bo: bud, br: bark, bu: bulb, co: cortex, dec: decoction, ext: externally f: collected by fevzi özgökçe, fl: flower, fr: fruit, gm: gum, gt: drops, hb: herb, inf: infusion, int: internally, lf: leaf, lx: latex, rt: root, sb: young shoot bark, sd: shoot, sl: stylus, sp: stipe, st: stem, tb: tuber, wp: whole plant; *first time reported, +: mix with.

or an infusion of the herbs is dropped into the nostrils.

Several plant species are used as topical remedies for rheumatic diseases. Bathing was the choice of application, but some plants were applied as a vesicant. The treatment period for vesicants is very important, because a long application period could cause several skin irritations.

Many of the plants are taken orally as a diuretic in the form of a decoction to remove kidney stones.

An interesting remedy is the use of *Leontice leontopetalum* roots in the treatment of epilepsy. A decoction prepared by boiling the pounded roots for 5 hours is taken on an empty stomach in the morning for 3 days.

Direct application of plant material, either fresh or dried, was the most popular method of application. Fresh materials are usually taken orally or applied externally after being pounded. Sometimes the material is cooked with a little water to prepare a poultice or applied after being roasted on a fire. In some cases, however, liquid plant products (e.g., a juice obtained by squeezing plant parts (usually leaves or roots), latex obtained by cutting the stem, and resins obtained by injuring the stem) are used directly without any additives. Dried material, generally powdered or sometimes moistened, is taken orally or applied externally. Some palatable additives (e.g., honey) are preferably mixed with powdered material for oral administration.

The second most common practice is the application of liquid preparations, mainly decoctions or infusions. Decoctions are prepared by boiling the powdered or crushed plant material with water for a few minutes. Filtration or straining, using a piece of cloth, is generally recommended to remove the residue.

Seven percent of the preparations are used as an ointment for skin treatments. Mixing the powdered or crushed plant with one or more suitable additives (e.g., butter, filtered yogurt, alum, petroleum jelly, honey, flour plus soap, or sulphur powder) is recommended for the preparation of ointments.

Taking a medicated bath is also practiced, especially for the treatment of rheumatism and a

cold. A bath is prepared by adding a plant part to hot water, or a warm decoction is prepared.

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TRADITIONAL MEDICINE IN TURKEY VII. FOLK MEDICINE IN MIDDLE AND WEST BLACK SEA REGIONS¹

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Türkiye’de Geleneksel Tababet VII. Orta ve Batı Karadeniz Bölgelerinde Halk İlaçları. *Orta ve Batı Karadeniz Bölgelerinde Amasya, Bilecik, Bolu, Çankırı, Samsun, Sinop ve Tokat illerinde halk tababeti incelenerek, 96’si bitkisel ve 5’i hayvansal olmak üzere 194 halk ilacı tespit edilmiştir. Kullanılan materyalin mahalli ismi, tedavide kullanılan kısımları, ilacın hazırlanış şekli ve tedavideki kullanılış amacı ile ilgili bilgiler liste halinde verilmiştir.*

Key Words: traditional medicine; Turkey; Black Sea region; north Anatolia.

The northern part of Anatolia by the Black Sea is called Black Sea subdivision or North Anatolia. Since this subdivision comprises lengthwise areas showing differences in topographic features, climate, ethnic origin, socio-economic welfare, etc., it seems reasonable to divide it into east, middle, and west Black Sea regions. High and continuous mountain ranges, which are parallel to the coastal line in the eastern part of Black Sea region (highest peak 3932 m, Kaçkar Mountain), spread out from Ordu to the west, where the highest peaks are set back from the coast and the mean altitude declines. Several rivers (Kızılırmak, Yeşilırmak) run into the Black Sea from the plateau, facilitating the infiltration of coastal climate into the interior parts. In par-

allel with the topographic change, the climate also shows variation and the heavy average annual rainfalls prevalent in the eastern parts, 2000 mm, which lessen in the west of Ordu, 500 mm, (except in the far western part of the subdivision, average precipitation 1000 mm).

We have already reported that the East Black Sea region is poor in folk medicine in spite of the rich flora, partly because of the economically important tea and hazelnut cultivation (Sezik et al. 1991). On the other hand, the agricultural as well as industrial development has not been fully realized in the middle and west regions of the Black Sea subdivision, so that the socio-economic situation is greatly different from that of the east region.

Little has been documented on the folk medicine of the west and the middle regions of the Black Sea subdivision, except for the use of folk medicine in the coastal provinces, Kastamonu (Sezik, Zor, and Yeşilada 1992) and the ethno-

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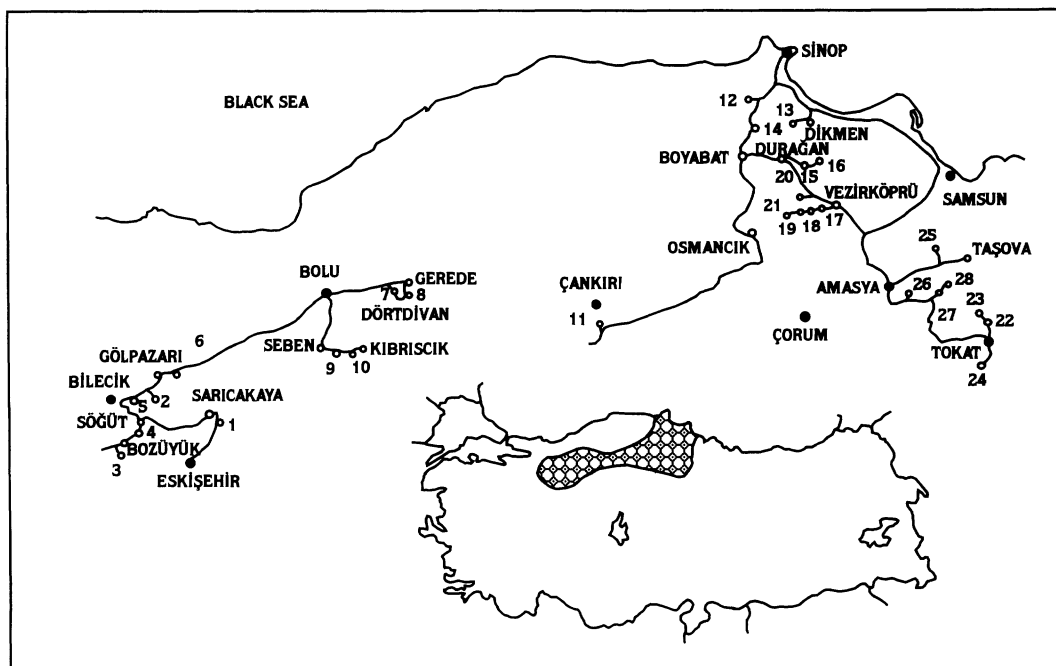


Fig. 1. Route of survey in the region and collection sites of the information. Numbers referring to the collection sites of the information are as follows; 1. ESKİŞEHİR, Sarıcakaya, Dağküplü, 2. BİLECİK, Söğüt, Harmankaya, 3. BİLECİK, Bozüyük, Göynücek, 4. BİLECİK, Söğüt, Kepen, 5. BİLECİK, Merkez, Deresakarya, 6. BİLECİK, Gölpazarı, Doğancılar, 7. BOLU, Dörtdivan, Yukarı Sayık, 8. BOLU, Gerede, Yeşilvadi, 9. BOLU, Seben, Çeltikdere, 10. BOLU, Kibriscik, Alanhimmetler, 11. ÇANKIRI, Merkez, Aşağı Pelitözü, 12. SİNOP, Merkez, Sazlı, 13. SİNOP, Dikmen, Babalıoğlu, 14. SİNOP, Boyabat, Akçakese, 15. SİNOP, Durağan, Sarıyar, 16. SİNOP, Durağan, Beyardıç, 17. SAMSUN, Vezirköprü, Karaköy, 18. SAMSUN, Vezirköprü, Sofular, 19. SAMSUN, Vezirköprü, Yukarı Narlı, 20. SAMSUN, Vezirköprü, Darıçalani, 21. ÇORUM, Osmancık, Zeytin, 22. TOKAT, Merkez, Sirçalı, 23. TOKAT, Merkez, Çerdiğin, 24. TOKAT, Merkez, Tahtaoba, 25. AMASYA, Taşova, Destek, 26. AMASYA, Merkez, Kale, 27. AMASYA, Merkez, Beldag, 28. AMASYA, Merkez, Yuvaköy.

botanical utilization of plants in Akdağ mountain in Amasya province (Alpinar 1979).

In the present report, in addition to plant drugs used in the middle (Samsun, Sinop, Amasya, Tokat, Çorum, Çankırı) and the west (Bolu) Black Sea regions, those in Eskişehir (Central Anatolia subdivision), and Bilecik (Marmara subdivision) are also described in consideration of their geographical features (the areas studied are geographically included in west Black Sea subdivision).

METHODOLOGY

Detailed methodology for the field survey of folk medicine has been described elsewhere (Sezik et al. 1991). Briefly, information was collected by interviewing with rural people in selected places. Field studies were performed in 28 villages which were selected from among differ-

ent parts of the subdivision (Fig. 1). Informants were then asked to guide us to the places where these plants grew or to bring the drug they use. In order to eliminate information of secondary sources, informants were also asked for the source of their knowledge. When a group of informants gave different answers to the medicinal use or the local name of a plant, they were asked to discuss the matter thoroughly among themselves to decide which statement was reliable. Further efforts were made to double-check any information provided by asking the opinion of older people in neighboring villages. Voucher specimens were prepared and numbered in duplicates and stored in the Herbarium of Faculty of Pharmacy, Gazi University, and the Herbarium of Medicinal Plant Garden, Kyoto University. Taxonomic determinations were performed by Sezik, Yeşilada and Honda (co-authors).

TABLE 1. FOLK MEDICINE IN MIDDLE AND WEST BLACK SEA REGIONS; SINOP, SAMSUN, TOKAT, AMASYA, ÇANKIRI, BOLU, BİLEÇİK, ESKİŞEHİR PROVINCES.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
Fungi				
<i>Langemannia</i> sp.	püslek	3	WP	As desiccant for wounds; ext, applied on wound after powdered [91A196]
	hoskulak	21	WP	As desiccant for wounds; ext, as described above [93C018]
	tozkulak	19	WP	As desiccant for burns; ext, as described above [93C023]
	porsuk	4	WP	To stop bleeding; ext, as described above [91A194]
Anacardiaceae				
<i>Rhus coriaria</i> L.	tetire	5	LF	For gastric ulcer, stomachache; int, dec [91A142]
Aspidiaceae				
<i>Polystichum aculeatum</i> (L.) Roth.	eğraltı	12, 13	HB	Against abdominal pain; ext, applied on abdomen [91D047]
Berberidaceae				
<i>Berberis crataegina</i> DC.	kızamık dikenli	14	RT	Against anal fistula; int, boiled, cooled for overnight, taken 3 times a day [91D024]
	karamuk	24	RT	As anthelmintic for cattle; int, boiled [91D181]
Betulaceae				
<i>Coryllus avelana</i> L.	yabani fındık	15, 16	LF	For sunstroke; ext, as bed, naked body of the patient is covered with fresh leaves [93C021]
Boraginaceae				
<i>Echium italicum</i> L.	kesikotu	19	RB	For wound healing; ext, root barks are peeled off and roasted in a pan with butter to prepare an ointment [93C008]
	havacıva	23	RT	For wound healing; ext, roots are washed and grated into a pan and roasted with butter, then squeezed through muslin to obtain an ointment [91D136]
Caprifoliaceae				
<i>Sambucus ebulus</i> L.	sultanotu	3	LF, RT	Against rheumatic pain; ext, fresh leaves are heated over a fire and applied on the body where it pains. In winter, dried leaves can be used after moistened, but usually roots are preferred in winter for the same purpose after being pounded, but fresh leaves are said to be more effective [90D042]
	yüyün = yetün	13	LF	Against rheumatic pain; ext, fresh leaves are heated over a fire and applied to site of pain [93C014]

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
	yıǵdın	23	LF	Against rheumatic pain; ext, leaves are boiled together in a large boiler with tar of pine tree "çam pürü", tar of <i>Juniperus</i> sp. tree "ardıç pürü", and rheumatic pains are treated by bathing the patient in this extract [91D129]
	yidinotu = ivdinotu	25	LF	Against rheumatic pain; ext, as described above for locality 23 [91D184]
	yavaşana = iyidin	12	LF	Against rheumatic pain and bruises; ext, pounded with salt and garlic and applied on body [93C012]
	iğdenotu	14	LF	Against rheumatic pain and bruises; ext, pounded
				For abscesses (for cattle); ext, roasted with butter and applied on abscess [91D019]
	ıyiden	17	LF	For hemorrhoids; int, dec [93C015]
<i>Sambucus nigra</i> L.	patlanguç = özübüyük	24	LF	For prostatitis; int, dec, on empty stomach [91D149]
<i>Viburnum opulus</i> L.	gilaburu	22	FR	As hypoglycaemic, to ease cough, to pass kidney stone; int, dec [91D190]
Compositae				
<i>Achillea setacea</i> Waldst. & Kit	ayvadana	3	FL + HB	For stomachache; int, dec, tea [90D049]
<i>Anthemis austriaca</i> Jacq.	akbaşotu	5	FL	For abdominal pain; int, dec, tea [91A141]
<i>A. cotula</i> L.	koyungözü	24	FL	Against pneumonia, pain in the chest; ext, flowers are cooked together with herbs of <i>Teucrium chamaedrys</i> and <i>T. polium</i> , leaf and flowers of <i>Althea setosa</i> , herbs of <i>Urtica dioica</i> , herbs of <i>Malva nicaensis</i> to prepare a poultice and applied ext for 24 hours [91D153]
	papatya	26	HB	Against stomachache, sore throat, bronchitis; int, dec [91D087]
<i>A. tinctoria</i> L.	papatya	26	HB	Against stomachache, sore throat, bronchitis; int, dec [91D141]
<i>Arctium minus</i> (L.) Bernh. ssp. <i>minus</i>	kocaot = kokarot	9	LF	For rheumatic pain, against fever, sunstroke; ext, fresh leaf is treated with salt and applied on joints or a poultice prepared by boiling the leaves in water is used to alleviate rheumatic pain. In case of high fever, due to an infection of sunstroke, naked body of the patient, often a child, is covered with fresh broad leaves to lower the fever [91A175]
	kabalak	14, 15	LF	For sunstroke; ext, garlic is pounded with filtered yoghurt and applied on naked body, then covered with the fresh broad leaves of the plant for 5-6 hours [91D023]

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
<i>Centaurea solstitialis</i> L.	büyükkabalak	20	LF	For sunstroke; ext, as described above [93C013]
<i>ssp. solstitialis</i>	acıkabalak	17	LF	Against inflammation; ext, a fresh leaf is directly applied on inflamed part [93C007]
<i>Helichrysum plicatum</i> DC.	çakırdikeni	11	SD	Against herpes infections around lips (for children); ext, roasted and applied after powdering [93B001]
	sarılık çiçeği	4	FL	Against jaundice; int, dec [91A182]
	yayla çiçeği	27, 28	FL	To pass kidney stone; int, inf [91D097]
<i>H. plicatum</i> DC.	yayla çiçeği	27	HB	For wound healing; ext, burned, ash is applied on wounds
<i>ssp. plicatum</i>		22	FL	For piles on hand and foot; int, dec, cooled for overnight [91D108]
<i>Onopordum turcicum</i> Danin.	kangaldikeni	24	HB	For hemorrhoids; int, dec, tea [91D150]
			SD	For hemorrhoids; int, swallowed
<i>Silybum marianum</i> (L.) Gaertner.	kocakavkas = başkavkas	5	SD	For shortness of breath in bronchitis; int, roasted, ground, boiled in water [91A143]
Cornaceae				
<i>Cornus mas</i> L.	kızılcnk	13	FR	Against diarrhea; int, boiled, cond. to a paste form [93C024]
	kirencik ekşisi*	17	FR	For sunstroke; ext, boiled fruits are put inside a cotton sack and squeezed to obtain a pulp and then condensed. This pulp is smeared on the body of the patient and then covered with the herbs of "sunanesi" (<i>Meniha</i> sp.) [93C016]
	zoğal = kiren	26	SD	For intestinal pain; int, roasted, milled, boiled with water [91D182]
Crassulaceae				
<i>Sempervivum armenum</i> Boiss. & Huet. var. <i>armenum</i>	temreotu	13	LF	To remove warts; ext, fresh plant is pounded to obtain juice [91D058]
Cruciferae				
<i>Brassica oleracea</i> L. var. <i>capitata</i> L.	kelem	7	LF	To reduce inflammation in rheumatis; ext, mixed with barley flour, boiled and applied on legs [91A183]
		22, 26	LF	For maturation of abscess; ext, fresh leaves are applied after heated on fire [91D185]
		23	LF	For maturation of abscess; ext, fresh leaves are cooked and mixed with butter and applied on abscess [91D191]
		24	LF	Against abdominal pain; ext, mixed with olive oil and applied on abdomen [91D187]
	keremotu	25	LF	For maturation of abscess; ext, heated on fire [91D180]

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
Cucurbitaceae				
<i>Bryonia alba</i> L.	ülüngül = ilengül	26	RT	For hemorrhoids; int, dec [91D087]
<i>Ecbalium elaterium</i> A. Rich.	acıdüylek	5	FR	Against jaundice; juice is directly applied into nostrils [91A148]
	çitlanbuk = yabani kavun	26	FR	Against jaundice; juice is directly applied into nostrils [91D085]
Cupressaceae				
<i>Juniperus communis</i> L.	ardıç, ardıç gugucu*	22	FR	For cough, pain, hemorrhoids; int, swallowed as pills [91D119]
<i>spp. nana</i>	ardıç katranı*	22	TR	Against scabies, heat rash; ext, applied to body for 2 days
<i>J. exelsa</i> Bieb.	karaardıç = dikenardıç	26	FR	For common cold and bronchitis; int, boiled, cooled [91D088]
<i>J. oxycedrus</i> L.	ardıç gilgilisi*	4	FR	For common colds; int, dec [91A191]
	dikenli ardıç evi*	12	FR	For hemorrhoids; int, swallowed like pills [93C022]
	ardıç katranı*	5	TR	For dysuria; int, dec, every morning before breakfast
				For maturation of abscess, wound healing; ext, a concoction of tar with onion juice, egg yolk and soap, is roasted in a pan and then applied on abscess for maturation, or tar is directly applied on wounds for rapid healing [91A187]
		8	TR	Against colds (for animals); int, swallowed [91A195]
	sarıardıç, sarıardıçevi*	14	FR	For bronchitis, cough; int, swallowed as pill or dec [91D025]
	karakatran*	15	TR	To ease cough; int, mixed with honey [93C025]
	tikenardıç	27	FR	For anal fistula; int, mixed with honeywax, swallowed [91D094]
Elaeagnaceae				
<i>Elaeagnus angustifolia</i> L.	iğde	10	RB	For dysuria; int, dec, tea [91A185]
Euphorbiaceae				
<i>Euphorbia stricta</i> L.	sütlegen	14	LX	To clean the spring water; One drop is put inside water [91D021]
<i>E. amygdaloides</i> L.	sütlegen	14	LX	To clean the spring water; One drop is put inside water [91D022]
<i>var. amygdaloides</i>				
Gramineae				
<i>Hordeum vulgare</i> L.	arpa	4	FR	For common colds; int, dec [91A192]
<i>Zea mays</i> L.	mısır	27	SD	For hemorrhoids; int, red seeds, eaten [91D183]
	mısır püskülü	27	ST	To pass kidney stone; int, dec, cooled

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
Juglandaceae <i>Juglans regia</i> L.	ceviz	2	FR ¹	Against malaria; int, dec [91A200]
		8	FR ¹	Against rheumatic pain; ext, pounded [91A188]
		9	LF	Against fever; ext, leaves are spread to form a bed for unclothed patient who is covered with fresh leaves [91A193]
		10	LF	Against rheumatic pain; ext, pounded [91A189]
		22	LF	For rheumatic pain; ext, mixed with raw salt, boiled and used as bath [91D196]
Labiatae <i>Mentha longifolia</i> L. <i>Mentha</i> sp.		12, 15	LF	For sunstroke; ext, naked body of a patient is covered with the fresh leaves [93C028, 93C030]
		16, 17		
	eşeknanesi	9	HB	Against stomachache; int, dec, tea [91A174]
	sunanesi	17	HB	For sunstroke; ext, patient's skin is smeared with the pulp of <i>Cornus mas</i> and covered with the fresh mint [93C006]
	kızıllık	7	RT	For wound healing; ext, grated roots are boiled together with the resin of <i>Abies bornmilleriana</i> , butter and beeswax, mixture is then condensed into an ointment form. It is applied every day on cuts and other wounds for 5 to 10 days [91A161]
<i>Salvia tomentosa</i> Miller	şabla	4	HB	Against rheumatic pain; ext, dec, bath, two pieces of herbs are boiled with two pieces of roots of <i>Helieborus orientalis</i> "kıkıranotu" and this extract is used as a bath for both men and animals [91A134]
<i>Teucrium chamaedrys</i> L.	mayasilotu	7	HB	For hemorrhoids; int, dec [91A164]
		23	HB	For swellings on hand or body; int, dec, cooled [91D130]
	kısacık mahmut	24	HB	Against pneumonia, pain in the chest; ext, herbs of <i>Teucrium chamaedrys</i> and <i>T. polium</i> , leaf and flowers of <i>Althea setosa</i> , herbs of <i>Urtica dioica</i> , flowers of <i>Anthemis cotula</i> , herbs of <i>Malva nicaensis</i> cooked together to prepare a poultice and applied ext for 24 hours [91D155]
<i>T. polium</i> L.	kısamahmut	4	HB	For common colds, bronchitis; int, dec [91A194]
	koyunotu	24	HB	For abdominal pain, to stop vomiting; int, fresh herbs are chewed or dec is taken [91D145]
				Against pneumonia, pain the chest; ext, as described above for <i>T. chamaedrys</i>

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
<i>Thymus longicaulis</i> C. Presl. ssp. <i>longicaulis</i> var. <i>subisophyllus</i> <i>T. transcaucasicus</i> Ronniger <i>T. zygoides</i> Griseb. var. <i>lycaonicus</i>	keklikotu kekik kekik	3 7 4	HB HB HB	For stomachache; int, dec, tea, on empty stomach [90D048] For common colds; int, dec, tea [91A162] For stomachache; int, inf, tea [91A138]
Leguminosae <i>Glycyrrhiza glabra</i> L. <i>Vicia ervilea</i> (L.) Willd. <i>V. faba</i> L.	buyan burçak karafasulye	11 1 13	RT SD LF	For stomachache, cough; int, dec [93B002] To ease cough, bronchitis; int, dec [90D050] For maturation of abscess; ext, fresh leaf is applied after heated on fire [91D195]
Liliaceae <i>Allium cepa</i> L.	soğan	12 13	BU BU	For maturation of abscess; ext, grated [93C031] For maturation of abscess; ext, grated bulbs are heated in a pan for a short time and mixed with grated soap, and then applied on abscess [93C033]
<i>A. porrum</i> L.	pirasa	10	BU	As hypoglycaemic; int, 2 kg of bulbs are boiled in water and 1 to 2 glasses of extract is drunk before meals [93C034]
<i>A. sativum</i> L.	sarımsak	9	BU	Against rheumatic pain; int, pounded with salt, applied on legs, joints [93C029]
<i>Smilax</i> sp. Linaceae <i>Linum usitatissimum</i> L.	hüzmelek yaprağı sağrek	12 19 23	BU LF SD	Against worms; int, pounded with milk [93C032] For wound healing; ext [93C009] For maturation of abscess; ext, pounded and boiled in milk [91D128]
Loranthaceae <i>Arceuthobium oxycedri</i> (D.C.) Bieb. <i>Viscum album</i> L. ssp. <i>album</i>	parda burcu çakırğa burcu kuşburnu gökçesi kuşburnu kökçesi	6 9, 10 22 23	HB HB HB HB	As panacea; int, dec, tea [91A181] For abdominal pain, bronchitis; int, dec, tea [91A177] For hemorrhoids; int, dec, cooled [91D194] For hemorrhoids; int, dec
Malvaceae <i>Alcea setosa</i> (Boiss.) Alef.	devegülü	24	FL + LF	Against pneumonia, chest pain; ext, flowers and leaves are cooked together with herbs of <i>Teucrium chamaedrys</i> and <i>T. polium</i> , herbs of <i>Urtica dioica</i> , flowers of <i>An-</i>

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
<i>Malva neglecta</i> Wallr.	ebegümeci	3	LF	<i>themis cotula</i> , herbs of <i>M. nicaensis</i> cooked together to prepare a poultice and applied ext for 24 hours [91D148] For maturation of abscess on neck; ext, boiled in milk, poultice is applied [90D047] For abdominal pain; ext, poultice, on abdomen [91D022] For abdominal pain; ext, boiled, mixed with barley flour to obtain a poultice [91D147] Against pneumonia, chest pain; ext, as described for <i>Alcea setosa</i>
<i>M. nicaeensis</i> All.	ebegümeci	14 24	LF HB	
Moraceae				
<i>Ficus carica</i> L.	yemiş	1, 2	LX	For scorpion bite, to relieve pain; ext, on bite [90D051]
<i>Morus nigra</i> L.	dut pekmezi*	1	FR	Against stomachache; int, one teaglass of condensed fruit juice is drunk every morning on an empty stomach [90D055] To cure baldness; ext, the ash of burned stem barks is mixed with unsalted butter, and the ointment thus obtained is applied on bald area [91D197] To treat herpes infection in mouth; int, one teaspoonful of condensed fruit juice is taken or fruit juice is used as gargle [91D186]
	karadut	26	BK	
			FR	
Oleaceae				
<i>Olea europea</i> L.	zeytin	8	FR	To remove an object from the skin; ext, pounded [93C037]
Papaveraceae				
<i>Chelidonium majus</i> L.	—	13	SS	Against pains; ext, applied directly [91D060]
Pinaceae				
<i>Abies bommülleriana</i> Mattf.	künar sakızı	7	RE	Against stomachache, indigestion; int, swallowed [91A184] For wound healing; ext, resin is boiled together with grated root of <i>Salvia aethiopsis</i> , butter and beeswax and the mixture is then condensed into an ointment form. It is applied every day on cuts and other wounds for 5 to 10 days For wound healing; ext, powdered [91A197] For maturation of abscess; ext, the resin, butter, and soap are filled in a hole which is opened in the middle part of
		8 9	RE RE	

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
<i>Pinus nigra</i> Arn. <i>ssp. pallasiana</i>	künar kozalaıkgı*	15	RE	an onion and then cooked on embers until butter melts.
	künar yalamıgı*	7	FR	The finger with abscess is inserted in the hole and kept there for 3 to 5 hours for maturation [91A201]
	çam sakızı*	7	IB	For wound healing, as antiseptic for wounds; ext [93C036]
		1	RE	For common colds; int, fresh, dec [91A185]
		10	RE	Against stomachache, as panacea; int, eaten
		10	RE	For maturation of abscess, to remove an insect sting from body; ext [90D056]
		7	RE	For maturation of abscess; ext, pounded with salt [91A205]
		13	RE	Against stomachache, indigestion; int, swallowed [91A186]
		7	IB	For cough, bronchitis; int, sieved and mixed with honey, one spoonful is taken every morning before breakfast
		12	IB	Against stomachache, as panacea; int, eaten
<i>P. sylvestris</i> L.	karaçam sakızı*	14	IB	To pass worms, as panacea, for liver diseases; int, eaten [91D188]
		8	YS	As panacea, for tuberculosis, bronchitis; int, eaten [91D192]
	çam filizi*	8	FR	Against rheumatism; int, dec [91A202]
	çam kozalağı*	25	FR	Against hemorrhoids; int, dec
	çam katrani*	10	TR	Against worms, anthelmintic; int, dec [91D200]
	karaçam	13	RT	For maturation of abscess; ext, mixed with salt
		23, 27	RE	Against bronchitis and cough; int, after peeling off the bark, cut into small pieces and cooked, cooled overnight and drunk as tea
	çam, çam pisesi*	22	RE	For wound healing; ext, ointment prepared by mixing with beeswax and butter [91D193, 91D096]
	çam, çam sakızı*	22	FR	For common colds, as an expectorant, anthelmintic; int, boiled in milk, cooled overnight and taken on empty stomach [91D189]
	taze çam gugucu*	27	TR	For common colds, as expectorant, as anthelmintic; int, eaten while fresh
	çam pürü*			For rheumatic pain; ext, tar is mixed with that of <i>Juniperus</i> sp. "ardıç pürü" and leaves of <i>Sambucus ebulus</i> and boiled together in a large boiler, rheumatic pains are treated by bathing the patient in this extract

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
Plantaginaceae <i>Plantago lanceolata</i> L. <i>P. major</i> L. ssp. <i>intermedia</i>	çam	23	YS	For tuberculosis; int, 2 kg of young shoots are boiled in 2 L of water and cooled overnight. One glass of extract is taken orally every day
	sinirotu	3	LF	For maturation of abscess, against pimple; ext, fresh leaf is heated on fire [90D043]
	hava yaprağı	23	LF	For maturation of abscess; ext, fresh, heated on fire, smear butter and apply [91D127]
	siyilotu = bağa yaprağı	24	LF	For maturation of abscess; ext, fresh [91D146]
	bağotu	26	LF	For maturation of abscess; ext, fresh [91D083], and for gastric ulcer, stomachic disorders; int, dried, mixed with honey and taken 2-3 teaspoonful daily
	duvarula	27	LF	For maturation of abscess; ext, fresh [91D092]
	siyilotu	7	LF	For gastric ulcer; int, dried, + honey
	sinirli kabalak	17, 18, 20	LF	For maturation of abscess; ext, fresh [91A198]
	siyilyaprağı	13, 14	LF	For maturation of abscess; ext, fresh [93C010]
	bey yaprağı	22	LF	For maturation of abscess; ext, fresh, pounded [91D061]
Plumbaginaceae <i>Plumbago europea</i> L. Polygonaceae <i>Rheum</i> sp. <i>Rumex pulcher</i> L.	sinirlibey yaprağı	21	LF	For maturation of abscess; ext, fresh, + grated soap [91D110]
	mayasilotu	2	RT, LF	For cuts; ext, fresh [93C035]
	çükündür mancan	13	LF	For eczema on hand, to stop itching; int, dec [90D021]
	aküfelik	25	SD	For maturation of abscess; ext, fresh, heated [91D056]
	efelik	26	SD	For hemorrhoids; int, boiled [91D068]
				For bronchitis; int, boiled, cooled, on empty stomach [91D084]
Punicaceae <i>Punica granatum</i> L.	nar	7	FR	For hemorrhoids; int, buy from bazaar, pericarp of the fruit is dried and powdered and mixed with honey to prepare pills. Three to six of these pills are taken internally to stop bleeding in hemorrhoids. It is nontoxic and can be used for a long period [91A204]
Ranunculaceae <i>Anemone narcissiflora</i> L.	mayısçiçeği	7	HB	To reduce inflammation in rheumatism; ext, fresh herbs are pounded and applied on legs [91A169]

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
<i>Helleborus orientalis</i> Lam.	kıçkıranotu = yelotu	4	RT	Against edema in legs (for cattle), toothache; ext, a small piece of root which is sharpened like a nail is inserted into a hole punched in the ear of cattle to reduce inflammation in rheumatism, or a small piece of root is inserted inside a cavity to treat toothache [91A135]
	boscuotu	6	RT	For edema in legs (for cattle); ext, two pieces of roots are boiled with two pieces of <i>Salvia tomentosa</i> herbs and used as bath for both men and animals or powdered roots may be used internally for the same purpose [91A206]
	bohçaotu	8	RT	For edema in legs; ext, as described above for locality 6 [91A210]
<i>Ranunculus arvensis</i> L.	sarıptrak	4	FL	To drain the edema in eczema; ext, pounded [91A136]
<i>R. muricatus</i> L.	yakıotu	3	HB	Against rheumatic pain; ext, pounded and applied on joints for less than an hour [90D046]
<i>R. repens</i> L.	mayisotu	22	HB	Against rheumatic pain; ext, fresh plant is pounded and applied on joints for about 30 min [91D112]
	tiktikdana	25	FL	To drain a yellow flux in rheumatic pain; ext, dried herbs are applied on joints for 1 day [91D080]
Rosaceae				
<i>Cydonia oblonga</i> Miller	ayva	2, 3 10, 13	LF	For common colds, cough, bronchitis; int, dec, tea [91A211, 91A212, 93C034]
<i>Malus communis</i> Poir.	elma	27	FR	For dyspepsia, to reduce libido; int, eaten [91D198]
<i>Potentilla reptans</i> L.	ylancıkotu	14	HB	Against edema, rheumatic pain, erysipelas; ext, fresh plant is pounded [91D041]
<i>Prunus avivum</i> L.	kirazçöpü	26	SK	As diuretic; int, dec [91D201]
<i>P. mahlep</i> L.	mehlep	23	LF	For high fever; ext, a mixture of garlic and salt in goat milk or yoghurt is applied to the body of a patient who lies naked on a bed covered with the leaves under sunshine for perspiration [91D200]
<i>P. persica</i> (L.) Batsch.	tiltamsak	2	LF	To stop bleeding; ext, pounded [91A207]
<i>Pyrus eleagnifolia</i> Pallas	çördük	23	FR	For diarrhea; int, dried, eaten [91D202]
<i>P. elaeagnifolia</i> ssp.				
<i>P. malus</i> L.	acuk, acuk pekmezi	25	FR	For sunstroke, as tonic; int, boiled [91D069]
	acuk = elma azması	26	FR	As hypoglycaemic; int, boiled, concd [91D199]
<i>Rosa canina</i> L.	köpek diken	4	FR, RT	Against hemorrhoids; dec is used ext as well as int [91A199]

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
	kuşburnu	22	RT	For anal hemorrhoids; int, dec, cooled [91D115]
		23	BR	Against itching on the leg, or arm; ext, tip of a branch, burned and oily excrete is dropped into a cup. It is applied on skin against a skin disease called "dermo", which causes itching on extremities [91D203]
<i>Rubus hirtus</i> Waldst & Kit.	dağdeveği	22	RT	As hypoglycaemic, for dysurea, and urethral stone; int, dec, tea [91D118]
<i>R. sanctus</i> L.	böğürtlen	23	RT, BR	As hypoglycaemic; int, dec, tea [91D154]
Salicaceae				
<i>Populus usbekistanica</i> Kom. ssp. <i>usbekistanica</i>	servi kavağı	10	BK	Against toothache; ext, a small piece which is cut from the interior part of fresh stem bark is put inside the tooth cavity [91A210]
Scrophulariaceae				
<i>Veronica anagallis-aquatica</i> L.	karaot	7	HB	For abdominal pain and rheumatic pain; ext, fresh young herbs are said to be most effective. Herbs are boiled in milk to obtain a poultice which is applied to abdomen for abdominal pain or aqueous extract is used as bath to alleviate rheumatic pain [91A167]
Solanaceae				
<i>Datura metel</i> L.	tatala	3	SD	Against hemorrhoids; int, dec [90D206]
<i>Hyoscyamus niger</i> L.	dişğırsiotu	3	SD	For toothache; ext, seeds are spread on boiling water and fumes are inhaled through the mouth to treat toothache caused by a worm [90D044]
	dişotu	24	SD	To expel worms from mouth which cause pain; ext, same way as described above for locality 3 [91D152]
	batbit	26	SD	For worms in toothcavities or eyes; ext, same way as described above for locality 3 [91D086]
	—	7	SD	For pain in eyes; ext, seed, spread on drying embers and eyes are exposed to the smoke, to dislodge drop worms, which have a white body and a black head from the patient's eyes suffering from a terrible pain. They do not remember the vernacular name of the plant [91A168]
	—	8	SD	For pain in eyes; ext, seed, boiled in water and eye is exposed to the vapour under a blanket to remove the worms causing a severe pain in eyes [91A170]
	gözotu	12	SD	For eye itching, eye pain; int, seeds are spread on drying embers and covered with a blanket. Eyes of the patient

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
<i>Lycopersicon esculentum</i> L.	kumackotu	23	SD	are exposed to the vapor under the blanket, patient also strikes his head to help dislodge the worms [91D146] To pass worms from eyes; ext, seeds are pounded with the tail fat of sheep and put on dying ember and eyes exposed to vapours under a blanket
	domates	13	FR	For maturation of abscess; ext, cut in halves, spread with some sugar and applied on abscess
Thymelaceae				
<i>Daphne oleoides</i> Schreber.	çoban süpürgesi	6	RT	For malaria; int, pounded with sugar [91A151]
Tiliaceae				
<i>Tilia rubra</i> DC.	ihlamur	12, 25 14	FL FL	For common colds, catarrh; int, inf, tea [93C037] For cough; int, inf, tea [93C043]
	sastivi = sasshivi	27	FL	For common colds, catarrh; int, inf, tea [91D095]
Ulmaceae				
<i>Ulmus glabra</i> Hudson	karaağaç	9, 10	RT	For fractured bones; ext, grated root, boiled and condensed to prepare a red-colored ointment and applied to a wrongly repaired fractured bone. It can soften the bone to fix again [91A180]
<i>Ulmus minor</i> Miller	karaağaç	26	RB	To relax the muscles, for decreasing the swellings and to ease fixing of dislocated bones; ext, boiled [91D091]
ssp. <i>minor</i>				
Umbelliferae				
<i>Coriandrum sativum</i> L.	kişniş	3	FR	For stomachache; int, dec [91A203]
Urticaceae				
<i>Urtica dioica</i> L.	dicirgen = ısırgan	9	HB	For rheumatic pain; ext, fresh, cooked with salt, and poultice is applied on legs [91A176]
	ısırgan	13 22 23, 28	HB HB HB	As hypoglycaemic; int, cooked as soup [91D057] For rheumatic pain; ext, poultice [91D206] Against snake bite, swelling in cattle's udders; ext, fresh [91D133, 91D204]
	jincari	27	HB	For rheumatic pain; ext, fresh [91D093]
<i>U. pilulifera</i> L.	ısırgan	5	RT	For hemorrhoids; int, dec [91A147]
			HB	For hemorrhoids; ext, poultice is prepared from herbs and the patient suffering from hemorrhoids sits directly on the poultice
	dicirgen	7	HB	For rheumatic pain; ext, poultice [91A160]
<i>U. urens</i> L.	ısırgan	26	HB	For rheumatic pain; int, dec or poultice, ext [91D082]

TABLE 1. CONTINUED.

Plant name	Local name ^a	Locality ^b	Parts ^c used	Use and administration [voucher specimens]
Verbenaceae <i>Verbena officinalis</i> L.	kangrenotu	24	HB	For hemorrhoids; ext, dec, cooled overnight and used to wash anal fistula As antiseptic for wounds; ext, pounded and applied on wounds, replace every day [91D156]
Vitaceae <i>Vitis vinifera</i> L.	devek = üzüm çibığı*	26	ST	For inflamed gum; ext, burned, ash mixed with vinegar is applied on gum [91D205]
Animal cattle	davar fişkısı*	4	FE	For common colds; ext, dung of cattle obtained in winter is roasted and spread on a bed on which naked patient is laid. To treat anal fistula; int, cooked, eaten To treat anal fistula; int For sunstroke; ext, unclothed patient is covered with the interior part of the fresh skin which is removed from a freshly sacrificed sheep
hedğehog turtle sheep	kirpi tosbağa koyunderisi*	8, 14 14 17	MT BL FS	For swelling on hand or anal fistula; ext, the abdominal part is immediately incised after killing the wild pork and hand is inserted inside to treat swelling on hand or the patient sits directly in contact with the incised abdomen to treat anal fistula. When the meat is getting cool it is ineffective
wildpork	domuz	20	WH	

^a In this column mainly local names of the vegetable or animal drugs are given. If more than one local name is used for the same material, names are separated by (=) symbol. Where a local name is marked with (*), the vernacular name of the used part of vegetable or animal drug is indicated. For example, "kısıklık ekşisi" is the local name of the concentrated juice of *Comus mas*, but the plant is called "kızılcak".
^b Numbers referring to the collection sites of information are given under Figure 1.
^c Parts used: BL, blood; BU, bulbs; BK, stem barks; BR, branches; FE, feces; FL, flowers; FR, fruits; FS, fresh skin; HB, herbs; IB, interior bark of the stem; LF, leaves; LX, latex; MT, meat; RB, root barks; RE, resin; RT, roots; SD, seeds; SK, stalks; SS, stem sap; ST, styles; TR, tar; WH, whole animal; YS, young shoots.
^d Application: dec, decoction; ext, externally; inf, infusion; int, internally; +, together with; X, hybrid of; /, or.
^e Immature fresh fruits.

RESULTS AND DISCUSSION

Data obtained from field surveys conducted in the selected sites of the subdivision are summarized in Table 1. Only the plants which could have been identified taxonomically are listed in the table with the Latin name, vernacular name, locality, part used, preparation of remedy and usage under their respective families which are arranged alphabetically. If different vernacular names are given for a plant specimen, data are also classified according to their vernacular names. Those plants that could not be fully identified for lack of botanical elements are not mentioned here, but elsewhere (Tabata et al. 1993).

Of 194 remedies originating from 96 plant species belonging to 41 families and 5 animals, 97 (50%) are recorded here for the first time as Turkish folk medicine (Sezik et al. 1991, 1992; Tabata et al. 1994; Yeşilada et al. 1993a and literature cited in these papers). Furthermore, 78 of 143 vernacular names (54.5%) of medicinal plants in Table 1 are also cited for the first time here.

The largest number of plant species (49 species) are used for the treatment of gastro-intestinal ailments i.e., stomachache, abdominal pain, hemorrhoids, ulcers, and diarrhea. On the other hand, 41 species are used to palliate skin problems such as abscess, wounds, eczema, and swelling. Other common ailments treated with plant remedies are: 34 species for respiratory system affections (cough, bronchitis, common cold, pneumonia), 20 species for inflammatory ailments (rheumatism, erysipelas), 15 species for fever and pains; and 13 species for transmitted diseases (herpes, malaria, tuberculosis, jaundice).

As shown in Table 1, the most widely used medicinal plants in these regions are two subspecies of *Plantago major*, which have been quoted in 12 localities with 10 different vernacular names but for the same utilization. This is followed by *Juglans regia*, which is used in 9 localities with the same vernacular name to palliate rheumatic pain or to alleviate fever in sunstroke or malaria, and by three species of *Urtica* which are used in 8 localities to alleviate rheumatic pain. Members of Coniferae order are also used frequently for the treatment of various disorders: three *Juniperus* species (Cupressaceae) in 9 localities, two *Pinus* species and one *Abies* species (Pinaceae) in 11 localities. Rosaceous plants are used frequently as herbal remedies; 11 species

from 7 genera are used for various disorders. This is followed in frequency by composites, 10 species from 7 genera.

At a village in Amasya (locality 27) where the ancestors of the inhabitants migrated from Georgia about 100 years ago, we found that not only the vernacular names but also the utilization of some plants was completely different from those in the neighboring villages. If a plant growing in the vicinity was known in Georgia, the plant bore its Georgian name when used for the same purpose as in Georgia. A locally used plant unknown to them in Georgia was called by its Turkish name. For this reason, some utilizations and vernacular names are similar to those reported in our previous paper resulting from our interview with a Georgian old woman practitioner living in a village in the east Black Sea region near the border of Georgia (Sezik et al. 1991). For example, in this village the fresh leaves of *Plantago major* are used externally for the maturation of abscess in inflammatory wounds as it is practised throughout Anatolia, but the dried leaves of the same plant are mixed with honey and taken orally for a unique treatment of gastric ulcers. Interestingly, the same utilization is also observed in the neighboring village (locality 26), but plants were called by a Turkish name. It is known that the leaves of another *Plantago* species, *P. asiatica*, are also used for the treatment of gastric ulcers in Russia (Voitenko, Lipkan, and Maksyutina 1983). In this connection, we recently have demonstrated that an aqueous extract of *Plantago major* leaves shows a significant anti-ulcerogenic activity against a stress ulcer in mice (Yeşilada et al. 1993b).

There are some interesting applications of medicinal plants which are worthwhile to point out here. The roots of *Helleborus orientalis* are used for the treatment of an inflammatory cattle disease called "bohça," which is characterized by swelling in extremities, lack of appetite, and diarrhea. For this purpose, a small nail-shape piece of the root is inserted in a hole opened in the external ear of the animal and kept there until it falls off. During that period it is said a yellow flux drains out from the application site and the disease will be cured. In addition, it is recommended to add some powdered, oven-dried roots to the feed for the cattle as a tonic. In the case of toothache, a small piece of the root is put inside a cavity in the tooth to stop the pain by an anaesthetizing effect. As another example of

interesting utilization, the grated roots of *Ulmus glabra* are boiled and condensed to prepare a red ointment which is applied to a poorly repaired bone fracture to correct it.

The results of this study as well as those obtained from a previous survey in the east Black Sea region (Sezik et al. 1991) suggest a great potential resource of traditional medicine in the western and the middle regions of the Black Sea subdivision. Although western medicine is accessible to the people in these regions to a large extent, many of them still continue to depend, at least in part, on herbal remedies, even though the herbal remedies are being replaced rapidly by modern medicine.

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- Handbook of Arabian Medicinal Plants.** Shahina A. Ghazanfar. 1994. CRC Press, Inc. 2000 Corporate Blvd. N. W., Boca Raton, FL 33431. 265 pp. (hard-cover). \$99.95. ISBN 0-8493-0539-X.

Few regions of the world have undergone such sweeping changes as the countries of the Arabian Peninsula. With the development of the oil economy, there has been a shift from the use of traditional remedies, usually based on the local flora, to medicines readily obtainable in pharmacies. Thus, it is critical to document the ethnobotany of the region. This volume does that.

The book is arranged by plant families. A short paragraph introduces the family noting its size, distribution, and chemical compounds of medical interest. This is followed by selected species with local names, description, distribution, phenology, medicinal uses, treatment, chemical composition, comments, and references. Some of these uses are new to me. For example, I was unaware of the use of *Citrullus colocynthis* as a dye. For each plant there are helpful, if sometimes

stylized, line drawings. The bibliography is up to date with few errors although titles are lacking, inexplicably, for some entries (e.g., Mansour, Saleh, and Boulos). I was surprised not to see reference to the work by Be-bawi and Neugebohrn for northern Sudan. An index of uses for various conditions and diseases is included as well as a general index.

While this book will be a valuable addition to the literature on uses of plants in the region, it lacks a clear focus. There is a brief discussion of traditional medicine, but we are never told how the plants were selected for inclusion nor how the information on local uses was obtained. Perhaps a more accurate title would be "Handbook of Southern Arabian Medicinal Plants" as there are few detailed discussions of uses other than Oman and Yemen.

This is a useful book at a substantial price. The high cost will limit its distribution.

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BOOK REVIEW



THE NEW YORK BOTANICAL GARDEN



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Traditional Medicine in Turkey VIII. Folk Medicine in East Anatolia; Erzurum, Erzincan, Ağrı, Kars, Iğdir Provinces

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TRADITIONAL MEDICINE IN TURKEY VIII. FOLK MEDICINE IN EAST ANATOLIA; ERZURUM, ERZİNCAN, AĞRI, KARS, İĞDIR PROVINCES¹

EKREM SEZİK,² ERDEM YEŞİLADA, MAMORU TABATA, GISHO HONDA, YOSHIHISA TAKAISHI, TETSURO FUJITA, TOSHIHIRO TANAKA, AND YOSHIO TAKEDA

Sezik,² Ekrem and Erdem Yeşilada (Gazi University, Faculty of Pharmacy, Ankara 06330, Turkey), Mamoru Tabata, Gisho Honda and Tetsuro Fujita (Kyoto University, Faculty of Pharmaceutical Sciences, Kyoto 606), Yoshihisa Takaishi (Tokushima University, Faculty of Pharmaceutical Sciences, Tokushima), Toshihiro Tanaka (Gifu Pharmaceutical University, Gifu), Yoshio Takeda (Tokushima University, Faculty of Integrated Arts and Sciences, Tokushima, Japan). TRADITIONAL MEDICINE IN TURKEY VIII. FOLK MEDICINE IN EAST ANATOLIA; ERZURUM, ERZİNCAN, AĞRI, KARS, İĞDIR, ARDAHAN PROVINCES. *Economic Botany* 51(3):195–211, 1997. Traditional drugs used in the east Anatolia including Erzurum, Erzincan, Ağrı, Kars, Iğdır, and Ardahan provinces have been surveyed. In this report, 169 remedies obtained from 87 plant species belonging to 38 families and 10 animal species are listed with their vernacular names, parts used, methods of preparing drugs, and traditional usages.

Türkiye’de Geleneksel Tababet VIII. Doğu Anadolu’da Halk İlaçları: Doğu Anadolu bölgesinde Erzurum, Erzincan, Ağrı, Kars, Iğdır ve Ardahan illerinin sınırları arasında bulunan köylerde kullanılan halk ilaçları incelenmiştir. Bu çalışmada tespit edilen 38 familyaya ait 87 bitki ve 10 hayvan türünden elde edilen 169 halk ilacı hakkında şu bilgiler tablo halinde verilmiştir; kullanılan materyalin mahalli isimi, Latince tam adı, tedavideki kullanılış amacı, kullanılan kısmı ve ilacın hazırlanış şekli.

Key Words: traditional medicine; Turkey; east Anatolia; medicinal plants.

East Anatolia is the largest subdivision of Turkey. It is mountainous with severe winters (Tabata et al. 1994). The altitude of mountains increases gradually towards the east and reaches over 1700 m in the plateaus in the north and far eastern regions. Since the whole area is too large to survey at one time, results obtained from two provinces in the south-east part of the subdivision, Van and Bitlis, have been reported previously and the folkloric utilization of plants and animals was compiled (Tabata et al. 1994).

In this study, field surveys were conducted on the northern and north-eastern plateaus of the subdivision in Ağrı, Iğdır, Kars, Ardahan, Erzurum, and Erzincan provinces. These areas

have not been investigated for medicinal plant resources, although several studies have been made on those in the neighboring provinces of the subdivision. In these studies mainly ethnobotanical information were reported including some medicinal utilizations of plants in Van, Bitlis, Hakkari, Siirt, Şanlıurfa provinces (n.b.: the latter two provinces are included in another geographical region, south-east Anatolia) (Özçelik et al. 1990), in Elazığ province (Tonbul and Altan 1989), in Munzur Mountains (Tunceli province) (Yıldırım 1985, 1994).

METHODOLOGY

Field studies were performed in 30 villages selected from various locations in each province (Fig. 1). The methodology of field survey has been described in previous reports in detail (Sezik et al. 1991 and Fujita et al. 1995). Voucher specimens, in duplicates, are deposited both in

¹ Received 8 August 1996; accepted 13 February 1997.

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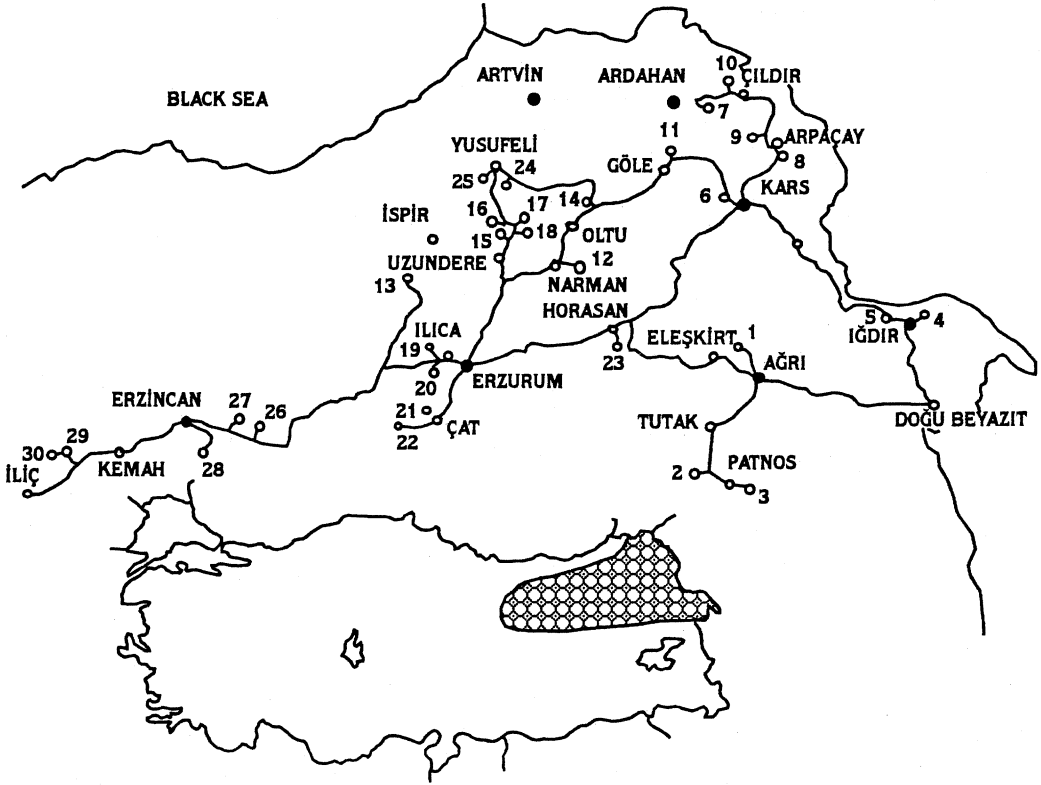


Fig. 1. Map of the survey areas (only the names of the cities and main towns are indicated by names, but villages by numbers). Collection sites of the information are as follows; 1. AĞRI, Eleşkirt, Sarıcan, 2. AĞRI, Tutak, Geçimli, 3. AĞRI, Patnos, Yalçinkaya, 4. İĞDİR, Melekli, 5. İĞDİR, Küllük, 6. KARS, Merkez, Çakmaklı, 7. ARDAHAN, Ölçek, 8. KARS, Arpaçay, Yalıncayır, 9. KARS, Arpaçay, Akmazdam, 10. KARS, Çıldır, Kaşlıkaya, 11. KARS, Göle, Yenidemirkapı, 12. ERZURUM, Narman, Mahmutçavuş, 13. ERZURUM, İspir, Mülk, 14. ERZURUM, Oltu, İriağaç, 15. ERZURUM, Uzundere, Dikyar, 16. ERZURUM, Uzundere, Çamlıyamaç, 17. ERZURUM, Uzundere, Altınçanak, 18. ERZURUM, Uzundere, Sapaca, 19. ERZURUM, Ilıca, Emrecik, 20. ERZURUM, Ilıca, Teprizcik, ERZURUM, Çat, Tuzluca, 22. ERZURUM, Çat, Yavi, 23. ERZURUM, Horasan, Velibaba, 24. ARTVİN, Yusufeli, Morkaya, 25. ARTVİN, Yusufeli, Tekkale, 26. ERZİNCAN, Merkez, Büyükköy, 27. ERZİNCAN, Merkez, Bayırbağ, 28. ERZİNCAN, Merkez, Tatlısu, 29. ERZİNCAN, Kemah, Çiğdemli, 30. ERZİNCAN, İliç, Sularbaşı.

the Herbarium of Faculty of Pharmacy, Gazi University and in the Herbarium of Medicinal Plant Garden, Kyoto University. Taxonomic determinations were done by Sezik, Yeşilada and Honda (co-authors), using the serial "Flora of Turkey and the East Aegean Islands" (Davis, 1965–1984) and related books and publications as well as by comparing with the specimens in the herbarias.

RESULTS AND DISCUSSION

Results obtained from field surveys are summarized in Table 1. Plants used as remedies are given under their corresponding families, arranged alphabetically. Data for each species are

presented in the following order: Latin name, local name, locality, part used, application and utilization, and the collection number of voucher specimen. Where a plant is known by with different vernacular names, information is given according to the vernacular names as well. Plants which could not be identified fully are not included in Table 1.

Of a total of 169 remedies obtained from 87 plant species belonging to 38 families and 10 animal species, 70.5% of the remedies have not been described in previous reports on traditional medicine in Turkey (Fujita et al. 1995; Sezik et al. 1991, 1992; Tabata et al. 1994; Yeşilada et al. 1993, 1995 and references therein). Further-

TABLE 1. FOLK REMEDIES IN EAST ANATOLIA; ERZURUM, ERZINCAN, KARS, ARDAHAN, AĞRI, İĞDIR PROVINCES.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
FUNGI				
<i>Longermannia</i> sp.	yaban mantarı		7 whole plant	To stop bleedings; ext, dried, powdered [90E231]
ASCLEPIADACEAE				
<i>Cyananchum acutum</i> L.	sütülsarmaşık		28 leaf	To drain the pus out of a wound; ext [91E114]
<i>ssp. acutum</i>				
ASTERACEAE				
<i>Achillea albana</i> Stev.	kılıçotu		7 herb	For rheumatic pain; ext, pounded herbs are applied and kept on legs for a while, to drain out the yellow fluid [90E167]
<i>Achillea biebersteinii</i> Afan.	kılıçotu		6 herb	For maturation of abscess; ext, pounded [90E152]
			29 herb	For wound healing; ext, pounded [91E145]
<i>Achillea millefolium</i> L.	sarılkotu		8 herb	Against jaundice; int, boiled [90E011]
<i>ssp. millefolium</i>	kılıçotu		29 herb	For wound healing; ext, pounded [91E145]
<i>Achillea schischkinii</i> Sosn.	kılıçotu		2 flower	For flatulence; int, powdered, ½ teaspoon is taken [90E090]
<i>Anthemis pseudocotula</i> Boiss.	papatya		5 flower	For stomachache; int, inf, tea [90E128]
<i>Arctium minus</i> (Hill.) Bernh.	löşlek		16, 18 leaf	For sunstroke; ext, yoghurt is applied on naked body and then covered with the broad fresh leaves of the plant for overnight [93D032]
<i>ssp. minus</i>				
<i>Arctium minus</i> Bernh.	düvetabani		11 leaf	For an inflammatory animal disease on legs; ext, dec [91E049]
<i>ssp. pubens</i> Arenes	yavşan		11 herb	As mosquito- or flea-repellent; either fresh or dried herbs are used; they hang the plant on their belts to keep the mosquitos away, or put the herbs under bed at home to get rid of fleas [91E053]
<i>Artemisia austriaca</i> Jacq.			14 herb	Against abdominal pain, internal pains; int, dec [91E064]
<i>Centaurea balsamita</i> Lam.	kılıçotu		11 leaf	For maturation of abscess; ext [91E048]
<i>Centaurea iberica</i> Trev.	çakırdikeni		29 leaf	For wound healing; ext, pounded [91E149]
<i>Centaurea pterocaula</i> Trautv.	çoruşbozan		21 leaf	For wound healing; ext, pounded [90E042]
<i>Helichrysum plicatum</i> D.C.	kaymak çiçeği		7 flower	For diarrhoea and intestinal diseases; int, dec, 1 glass daily for 2-3 days is taken [90E170]
<i>ssp. polyphyllum</i>				
<i>Circium</i> sp.	kilindor		3 root	For hemorrhoids, and internal diseases; int, dec [90E099]
	çakırdikeni		20 stem	For cough, bronchitis; int, fresh plant [90E010]
	= kavruhan			

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
<i>Scorzonera tomentosa</i> L.	pınar		26 latex	For wound healing; ext, +butter [91E093]
<i>Tanacetum argyrophyllum</i>	nalbant		27 latex, root	For wound healing; ext, +butter [91E093]
(C. Koch) Tzvel. var. <i>argyrophyllum</i>	yavşan		10 herb	For scabies; ext, herbs are burnt and ash is mixed with sulfur, gunpowder and butter to prepare an ointment. 1 or 2 applications is said to be enough for treatment [91E042]
<i>Tanacetum balsamita</i> L.	kılıçotu		9 leaf	For wound healing; ext, fresh [91E028]
<i>Tripleurospermum monticolum</i>	bağa yaprağı		9 leaf	For maturation of abscess; ext, fresh
(Boiss. & Huet.) Bornm.	papatya		23 flower	For stomachache; int, inf, tea [90E066]
<i>Tragopogon buphtalmoides</i>	yemlik		6 leaf	As stomachic; int, fresh [90E148]
(D.C) Boiss. var. <i>buphtalmoides</i>			8 latex	For warts; ext [91E212]
BERBERIDACEAE				
<i>Berberis vulgaris</i> L.	kızambuk		12 root	For jaundice in animals; int, by licking [90E215]
× <i>B. crataegina</i> D.C.		14, 16, 17	root	For jaundice in man; int, by licking [93D036]
BETULACEAE				
<i>Coryllus avellana</i> L.	findik		2 seed	For treating female infertility; int, the dried meat of a trout (bone should be separated before drying) is pounded with a mixture of two walnuts, one hazelnut, resin of pine tree, and tail at of a male sheep (as a main ingredient) to prepare a vaginal suppository. Six of this drug are inserted into the vagina every evening on the second day after the end of a menstrual cycle. During the treatment, a glass of the decoction of licorice roots should be taken as well [90E234]
BORAGINACEAE				
<i>Alkanna megacarpa</i> D.C.	havaciva		29 root bark	For wound healing, for burns; ext, root barks are peeled and cooked in a pan with the grated wood of <i>Pinus</i> sp. and butter to prepare an ointment, the wound should be kept open [91E155]
<i>Arnebia densiflora</i>	havaciva		27 root bark	For wound healing, for burns; ext, same as described for <i>Alkanna megacarpa</i> roots [91E127]
(Nordm.) Ledeb.				
<i>Echium russicum</i> J.F. Gmellin	havaciva		7 root	For fissures on hand and wound healing; ext, grated roots are cooked in a pan with butter to prepare a reddish ointment and then applied on skin. It is used for both human and domestic animals i.e. fissures on cow udder [90E165]

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration : [Voucher specimen]
<i>Echium vulgare</i> L.	havacıva	7	root	For fissures on hand and wound healing; ext, same as described for <i>Echium russicum</i> [90E184]
<i>Onosma seticeum</i> Willd.	havacıva	20	root bark	For wound healing; ext, red barks of the roots are peeled and cooked in a pan with butter to prepare an ointment and applied on wounds [90E016]
<i>Onosma microcarpum</i> Steven ex D.C.	havacıva	23	root	For burns; ext, butter, beeswax and pine wood are cooked in a pan, then the wood is removed. The remaining mixture is then mixed with grated root of the plant to prepare an ointment and applied on skin [90E064]
CAPRIFOLIACEAE				
<i>Sambucus nigra</i> L.	patırık	30	leaf	For maturation of abscess; ext [91E151]
CARYOPHYLLACEAE				
<i>Silene saxatilis</i> Sims.	simotu	11	herb	For wound healing; ext, pounded [91E045]
CHENOPODIACEAE				
<i>Beta corolliflora</i> L.	kızılca	22	root	For hemorrhoids; int, dec [90E052]
<i>Beta vulgaris</i> L. ssp. <i>rapa</i> f. <i>altissima</i>	kırmızı pancar	30	tuber	Against constipation; int, cooked with wheat and eaten [91E164]
CORNACEAE				
<i>Cornus mas</i> L.	kızılçık pestili* or kızılçık ekşisi*	15, 17	fruit	For diarrhea; int, fruits are boiled and condensed to a thick paste and then spread on a piece of cloth and dried under sun. The cloth is then removed and dried sheets thus obtained "kızılçık pestili" are kept at home for use in winter, but fresh fruits are also said to be effective, when available, or boiled fruits which are called as "kızılçık ekşisi" can be used instead [91E156]
CRUCIFERAE				
<i>Alyssum pateri</i> Nyar.	Çulık	3	herb	For wound healing; ext, powdered [90E107]
<i>Brassica oleracea</i> L. var. <i>capitata</i>	lahana	19, 21	leaf	Against fever, headache; ext, sliced, applied on forehead [90E239]
CUCURBITACEAE				
<i>Cucurbita pepo</i> L.	kabak, kabak çekirdeği*	24	leaf	For maturation of abscess; ext [90E245]
		14, 27	seed	As antheimintic; int, one tea glass of seeds is eaten on empty stomach [91E240]

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
CUPRESSACEAE				
<i>Juniperus oxycedrus</i> L.	dikenli ardiç çirtı		14 fruit + leaf 15 tar	Against rheumatism; ext, dec, bath [91E244] For parasitic diseases, fractured or dislocated bones; ext, tar is obtained by heating the wood inside a large pottery on an open fire and applied ext on broken or dislocated bones in man or against parasitic diseases in animals [93D008] For cough (for animals); int, dec [91E241] For cough (for animals); int, dec [91E132] For cuts and wounds as antiseptic; ext, stem juice [90E242]
DIPSACACEAE				
<i>Cephalaria sparsipilosa</i> Mathews	tikenardıçı çekem		15 fruit 27 fruit	
ELEAGNACEAE				
<i>Eleagnus angustifolia</i> L. var. <i>orientalis</i> (L.) Kuntze	gevrik iğde		13 latex 14 leaf	For sunstroke; ext, the leaves of <i>Eleagnus angustifolia</i> (iğde), <i>Juglans regia</i> (ceviz) and <i>Mentha longifolia</i> are boiled together and used as a bath, some other plants may be added for a stronger effect [91E237] For wound healing; ext [90E175] for eczema; ext, flowers are applied on skin by rubbing and then the affected area is washed with a lime solution to treat eczema [90E230]
EUPHORBIACEAE				
<i>Euphorbia agraria</i> Bieb. <i>Euphorbia virgata</i> Waldst. & Kit.	sütotu sütlücan =sütcan		7 latex 13 flower	
FUMARIACEAE				
<i>Fumaria microcarpa</i> Boiss. ex F.	şahtere		19 herb	For piles, or for eczema on hand; int, one glass of decoction of flowering herbs is taken every morning on empty stomach for 10 days. Although fresh herbs are more effective, dried herbs are also used for the same purpose in winter [90E002] For toothaches, wounds on the palate and other dis-eases; dec, gargle [90E169] For toothache; int, dec [90E035]
<i>Fumaria officinalis</i> L.	nuzla otu şahtere arpa		7 herb 21 herb 4 fruit 13 fruit	Against itching; ext, pounded, boiled, applied as poultice [91E165] Against rheumatism; int, pounded, boiled in yoghurt juice [91E171]
GRAMINAE				
<i>Hordeum vulgare</i> L.				

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
<i>Zea mays</i> L.	cala püskülü mısır püskülü		22 fruit 24, 25 fruit 14 style 25 style	For dysurea; dec, int [90E244] For maturation of abscess; ext, poultice [90E248] To pass kidney stone; int, dec, tea [91E170] For cough; int, dec, +honey [90E232]
JUGLANDACEAE				
<i>Juglans regia</i> L.	ceviz		2 seed	For treating female infertility; ext, as described for <i>Cor- yillus avellana</i> [91E157]
			14 leaf	For sunstroke; ext, dec, bath, as described for <i>Eleagnus angustifolia</i> [91E161]
			18 leaf	For sunstroke; ext, as a bed, the patient's body is cov- ered with fresh leaves [91E175]
			24 leaf	For hemorrhoids; ext, applied on piles [90E233]
LAMIACEAE				
<i>Mentha longifolia</i> L.	pünk		1 herb 2 herb 3, 26 herb 6 herb	For internal diseases, abdominal pain; int, dec [90E072] Against menstrual pain; int, inf, tea [90E091] Against stomachache; int, dec [90E108, 91E099] For cough, bronchitis; int, dec, tea [90E149] For headache; inhale the vapors of hot dec
	yarpız		21 herb 14 herb	For stomachache, hemorrhoids; int, dec [90E037] For sunstroke; ext, dec, bath, as described for <i>Eleagnus angustifolia</i> [91E214]
<i>Salvia nemorosa</i> L.	gendaş =gemtaş	16, 18, 24	herb	To stop bleeding, wounds; ext, pounded and applied on wounds [93D033, 91E076]
<i>Teucrium polium</i> L.	merven merven		2 herb 3 herb 27 herb	For diarrhoea, hemorrhoids; int, dec [91E158] For internal diseases; int, dec [90E101] To stop bleeding; ext, pounded [91E131]
LEGUMINOSAE				
<i>Glycyrrhiza glabra</i> L.	tatlı biran payam		28 root 29 root 2 root	For cough, bronchitis; int, dec [91E175] As stomachic; int, dec [91E146]
<i>Lathyrus sativus</i> L.	süs çüşne		19 seed	To stop pain in fractured bones or injuries; ext, pound- ed, +water to obtain a dough [90E247]
<i>Onopodium bracteatum</i> Boiss. et Heldr.	kangal=kobuk		8 seed	Against hemorrhoids; int, milled seeds are mixed with pure honey (with honeycomb) and one teaspoonful is taken every morning and evening on an empty stom- ach [91E012]

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
<i>Trifolium pratense</i> L. var. <i>pratense</i> LILIACEAE <i>Allium cepa</i> L.	üçkulak soğan	 25	leaf 4 bulb 19 bulb	For wound healing; ext [91E072] For bee stings; ext, cut in halves [90E251] For fractured bones; ext, grated bulbs are mixed with al- bumen, pine tar (karasakız), and grated soap to obtain an homogeneous mixture and applied ext on a frac- tured bone after fixing [90E248] For wounds; ext, sliced, cooked [91E168] For maturation of abscess; ext, cooked in ashes [90E260] For maturation of abscess; ext, grated, boiled with milk [91E159] Against sprains; ext, pounded with salt [91E177]
MALVACEAE <i>Althea cannabina</i> L. <i>Malva neglecta</i> Wallr.	şahmehlemi dolik	 5 root 1 herb 2 herb	 25 bulb 3 herb 23 herb	For calcinosis; ext, pounded, boiled, + flour [90E127] For abdominal pain; int, dec [91E166] To protect wounds from infection; ext, poultice For peptic ulcer; int, herbs are dried under shade and powdered, mixed with white alum and a yellow root (they don't remember the name) sold by akhtar (herb dealer). One teaspoonful of this mixture is taken be- fore every meal [90E095] For maturation of abscess; ext, pounded herbs are boiled in buttermilk and then flour is added to prepare a thick poultice and applied ext. on abscess [90E109] For common colds; ext, dec, bath [90E069] For wound healing; ext, fresh [90E155] To treat infertility (for women); ext, leaves are boiled together with the roots of karakuşburnu (<i>Roda canina</i> L.) and flowers of sandal (an Asteraceae plant which could not be supplied) and the extract used as tea as well as a bath for curing infertility in women For maturation of abscess; ext, pounded with flour, + butter For stomachache; int, dec [90E001]
	tolik =ebemkümeçi emeçkümeçi =ebemkümeçi ebemkümeçi	 6 leaf leaf 19 herb	 herb herb	

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
MORACEAE <i>Ficus carica</i> L.	ebemgümeci	5	herb	For maturation of abscess; ext, poultice, herbs are boiled to prepare a poultice and mixed with a poultice prepared from the root barks of <i>Ulmus carpinifolia</i> and applied ext on abscess for overnight to drain the inflammation out [90E124]
	ebegümeci	9	herb	For maturation of abscess; ext, herbs are boiled in milk and then mixed with 1 tablespoonful of flour to obtain a poultice [91E029]
	ebemkövenci	11	herb	For wounds; ext, poultice applied on wounds [91E056]
	korkut =emekümeci	7	herb	For bronchitis; ext, poultice applied on neck For indigestion; int, poultice For abdominal pain, constipation, sore throat; ext, pounded herbs are cooked in a pan with barley flour, and applied on abdomen to alleviate abdominal pain and constipation, or on the neck for sore throat [90E177]
	berberu	26	herb	For common colds, infertility, women diseases; int, dec, bath [91E098]
<i>Morus alba</i> L.	kuru incir*	1	fruit	For inflamed breast; ext, dried, moistened [91E187] ext, for 3–4 days
	dut pekmezi*	2 15, 18	fruit fruit	For diarrhoea; int, with milk [91E184] For maturation of abscess; ext, fruits are boiled and condensed to a thick syrup form and applied [90E255]
	dut pestili*	15, 18	fruit	For stomach disorders; int, boiled and condensed fruits For maturation of abscess; ext, boiled and condensed fruits are mixed with flour and spread on a piece of cloth, then dried under sun to obtain sheet-like layers. This product is kept at home to use either as medicine or food
	tut pestili*	17	fruit	For maturation of abscess; ext, boiled and condensed fruits [90E252]
				For stomach disorders; int, boiled and condensed fruits

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
OLEACEAE <i>Olea europaea</i> L.	beyazdut		29 fruit	For gastric ulcers, stomachic disorders; int, fruits are boiled with sugar and condensed. One tablespoonful of this extract is taken orally every morning on an empty stomach [91E174]
	karazeytin		19 fruit	For sprains to palliate pain and decrease swelling; ext, pounded black olive and grated apple fruits are mixed with the lung of a cow or a sheep to obtain an homogenous cake and applied ext on sprains [91E186]
	zeytin		24 leaf	For hemorrhoids; int, the first extract of the leaves which obtained by boiling for a short time is discarded and then a second extract is prepared and used orally [91E190]
PINACEAE <i>Abies nordmaniana</i> (Stev.) Spach. <i>Pinus sylvestris</i> L.	köknar pisi* =ladin pisi* sarıçam sarıçam katranı =karasakız çam soymuğu*		24, 25 tar	For wound healing, maturation of abscess; ext [91E189]
			14 tar	For wound healing; ext, +butter [90E2256]
			25 tar	For snake bite; ext, +egg yolk [91E178]
PLANTAGINACEAE <i>Plantago major</i> L. ssp. <i>intermedia</i> <i>Plantago major</i> L. ssp. <i>major</i>			24 stem sap ²	As panacea, for tuberculosis; int [90E2235]
	belhavz		3 leaf	For maturation of abscess; ext, fresh [90E098]
	katurturnağı		27 leaf	For maturation of abscess; ext, fresh, smeared with butter [91E117]
	bağa yaprağı	5, 7, 11, 12, 14, 15, 17	leaf	For maturation of abscess; ext, fresh [90E125; 90E168] [91E052; 93D009]
			10 leaf	[93D043] For wounds and rashes on the body; ext, dec, bath [90E208] For hemorrhoids; int, dec
	boğa yaprağı		16 leaf	For maturation of abscess; ext, fresh [93D031]
	belhavz		8 leaf	For maturation of abscess; ext, fresh [91E010]
	supazısı		24 leaf	For maturation of abscess; ext, fresh [91E215]
	sinirliot		25 leaf	For maturation of abscess; ext, fresh [91E071]
	siğilotu		29 leaf	For maturation of abscess; ext, fresh [91E147]
	amin		26 leaf	For maturation of abscess; ext, fresh, smeared with butter [91E095]

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
POLYGONACEAE				
<i>Polygonum cognatum</i> Meisn.	ebemkümeçi	6	leaf	For erysipelas, inflamed or infected wounds; ext, fresh [90E151] For stomachache; int
RANUNCULACEAE				
<i>Clematis orientalis</i> L.	muşurbazotu	22	herb	For maturation of abscess; ext, dec, + flour [90E051]
<i>Ranunculus neopolitanus</i> Ten.	mısırbazotu	17	herb	Against rheumatism; ext, pounded herbs are put inside an empty pericarp of walnut and applied on legs for 24 h. Should not be applied on joints [93D042]
<i>Ranunculus repens</i> L.	mayıs çiçeği = sarıçiçek mayıs çiçeği	9, 10, 11	herb flower	For maturation of abscess; ext To reduce inflammation on rheumatism; ext, pounded [91E014; 91E050]
<i>Ranunculus sericeus</i> Banks & Sol.	şelepuk	20	herb	For rheumatism, edema; ext, pounded herbs are applied on legs for max. 1 h to drain the edema out [90E005]
<i>Thalictrum minus</i> L. var. <i>minus</i> ROSACEAE	karakatranotu	2	whole plant	To reduce inflammation in rheumatism; ext, pounded [90E093]
<i>Cydonia oblonga</i> Miller ayva		1	herb	For maturation of abscess; ext, poultice+flour [90E078]
<i>Rosa canina</i> L.	şilan	4	leaf	For diarrhoea; int, dec [91E185]
		1, 7, 12, 13	fruit, root	For hemorrhoids; int, dec, tea [90E075, 90E187, 90E207, 90E243]
		2	root, leaf, or flower	For cough, bronchitis; int, inf, tea [90E179]
	karakuşburnu	6	fruit, root	For hemorrhoids; dec is drunken as tea as well as used as a bath inside, or applied ext on fistula while it is hot [91E160]
		14	fruit	For hemorrhoids; int, cooked, mashed [91E214]
	kuşburnu	19, 22, 10	root	For hemorrhoids; int, dec [90E004]
		20	fruit	For hemorrhoids; int, dried fruits are boiled and pulps are removed by sieving. The extract is then concentrated by boiling on fire. One glass of this condensed extract is taken every day for 3—4 days [90E241]
		11	fruit, root	For hemorrhoids, cough; int, dec [91E051]
	karadiken	8	root	For hemorrhoids; int, dec [91E210]

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
<i>Rubus hirtus</i> Waldst. & Kit.	piçüzümü =yabanüzümü		fruit	For hemorrhoids; int, eaten
<i>Rubus idaeus</i> L.	tiri-irazi		27 root	Against diabetes; int, dec [91E125]
			1 aerial parts	For curing sterility; int, aerial parts are boiled and put inside a jug made of zinc. This extract is drunk every morning and evening on an empty stomach for 1-2 months for curing sterility. It is effective for both man and woman who want children [90E079]
<i>Sorbus domestica</i> L.	hurma=üvez		24 leaf	As desiccant in burns; ext, ash, sieved [91E073]
	hurma		25 leaf	For cough; int, dec [93D002]
			fruit	For diarrhea; int, eaten
RUTACEAE				
<i>Citrus limonum</i> Risso	limon		1 fruit	Against high fever (for children); est, juice, on body [91E176]
SALICACEAE				
<i>Populus nigra</i> L.	kavak= kavak, çürüğü*		29 rotten wood	To stop bleeding; ext, powdered [90E249]
SOLANACEAE				
<i>Hyoscyamus niger</i> L.	batbat		14 seed	Against itching in the eyes; ext, seeds are spread on drying embers and eyes are exposed to fume to treat itching in the eyes caused by worms [90E250]
			17, 19 seed	Against toothaches; ext, seeds are spread on dying embers and smoke inhaled through mouth. Small white worms with black head are dropped inside a cup of water on fire ³ [93D044, 90E003]
	batbata		8 seed	Against toothaches; ext, same as described above [91E009]
	batbatı		20 seed	Against toothaches; ext, same as described above [90E006]
<i>Solanum tuberosum</i> L.	şakşaku		27 seed	Against toothaches; ext, same as described above
TYPHACEAE	patates	19, 20, 21	tuber	For fever and headache; ext, slices, applied on forehead
<i>Typha latifolia</i> L.	—		29 flower	To stop bleedings; ext, [90E238]
ULMACEAE				
<i>Ulmus carpinifolia</i> Gleditsch.	karaağaç		5 root bark	For maturation of abscess; ext, poultice, mixed with the poultice prepared from <i>Malva</i> sp. herbs and applied on abscess for overnight [90E129]

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
UMBELLIFERAE				
<i>Eryngium bilardieri</i> Delar.	gelenk		1 root	For maturation of abscess; ext, pounded, boiled with flour, poultice applied [90E076]
	boğadikeni		22 root	For maturation of abscess; ext, pounded, boiled with flour, poultice applied [90E049]
URTICACEAE				
<i>Urtica dioica</i> L.	ısrıgan	6, 9, 12, 15, 16, 17, 28	herb	Against rheumatism and rheumatic pain; ext, fresh [90E158, 90E209, 93D011, 93D038, 91E121]
		20		Against rheumatism, rheumatic pain; ext, poultice [90E009]
		22		For stomachache; int, a poultice is prepared and eaten [90E058]
		6, 22		For cough, colds; int, dec, int [90E158]
	ğijirtken = ısrıgan	11		Against rheumatism; int, dec [91E059]
<i>Urtica haussknechtii</i> Boiss.	çinçar dınk	7		Against rheumatism; ext, fresh [90E174]
	ısrıgan	26		Against rheumatism; ext, fresh [91E097]
		27	herb	Against rheumatism, swellings in legs; ext, fresh [91E115]
<i>Urtica pilulifera</i> L.	gezgezk	1, 2	herb	For abdominal pain, internal diseases; int, dec [90E070]
		2, 3		For rheumatic pain; ext, fresh or dec, int [90E253]
<i>Urtica urens</i> L.	çinçar	7	herb	Against rheumatism; ext, fresh [90E179] it is said to be more effective than <i>U. dioica</i> .
ZYGOPHYLLACEAE				
<i>Peganum harmala</i> L.	üzerlik	14	seed	For stomachache; int, pounded with honey [91E065]
<i>Tribulus terrestris</i> L.	dadaşotu	28	herb	For diarrhea; int, dec [91E113]
ANIMAL				
bear (fat)	ayı yağı*	8	fat	Against hemorrhoids; int, melted fat is absorbed on crumbled bread and eaten. In spite of the nasty taste, it is said to be very effective
cow (lungs)	davar akciğeri*	23	lung	For erysipelas; ext, first alum is spread on the inflamed part, then fresh whole lung is applied for overnight to reduce the inflammation
		19	lung	For sprains; ext, pounded black olive and grated apple are mixed with the lung to obtain an homogenous cake and applied ext on sprains

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
leech rabbit slug	sulutkan		5 whole	Against rheumatism; ext, applied on joints
	tavşan gıgısı*		19 feces	For maturation of abscess; ext
	şeytanuk		1, 2 whole	For abscess or gangrenous wounds, for wound healing; ext, pounded with green alum, applied
sheep	karaciğer*		1 liver	For gangrenous wounds; ext, a tourniquet is applied to either arm or leg which is then incised with a razor to drain blood. After that, the inner side of a fresh skin just removed from a freshly sacrificed sheep is applied for half a day. Then a poultice prepared from the herbs of <i>Malva</i> sp. is applied on the wound to protect from infection. Instead of fresh skin, fresh liver or fresh paunch, without washing, can be used.
		29	liver	Against jaundice; int, a gland found in the liver is mixed with honey and swallowed. It is said to be very effective
	taze deri*		1 fresh skin	For gangrenous wounds; ext, used as described for liver
		8	fresh skin	For bruises, hematoma; ext
snail	işkembe*		1 paunch	For gangrenous wounds; ext, used as described for liver
				For snake bite; ext, the poison is first drained out by incising the affected part with a razor and then yoghurt is smeared, followed by the application of a washed paunch of sheep
	koyun kuyruğu*		8 tail fat	For bruises and hematoma; ext
	kirliyün*		19 crude wool	Against pain; ext, applied on joints
snail	sümüklüböcek		25 whole	For snakebite; ext, living snail is put on the bitten site. When the snail sucking the poison falls down, it has to be replaced with a new snail
	ylankılıfı*		17 skin	For erysipelas; int, eaten with breas as a sandwich
snake		4		For hemorrhoids; ext, mixed with a plant (not collected) and prepared as an ointment, applied on fistulas
	örtümcek ağı*	20	cobweb	To stop bleeding; ext, applied on cuts

TABLE 1. CONTINUED.

Species	Local name ^a	Locality ^b	Parts used	Use and administration ^c [Voucher specimen]
trout	alabalık	2	whole	For treating female infertility (see <i>Coryllus avellana</i>). To fix broken bones; ext, trout is cut into two pieces and applied on wrongly fixed fractured bone to loosen the bone, so that they may easily be separated and then fixed correctly again. Albumen is mixed with grated raw soap to use as an ointment which is then applied to the repaired bone which is fixed with 2–3 pieces of wood
	kizilabalık	5	whole	To fix broken bones; ext, as described above

¹ Broad basal leaves of the plant are called as “bağa yaprağı” and applied on abscess for maturation and to protect wounds from infection. The basal leaves resembled that of *Plantago* spec. which is commonly known as “Bağa yaprağı,” and used for the same purpose, so probably a misutilization is in question in this village.
² A juice obtained after peeling the bark of stem is called “çam soymuğu”.
³ For details see Tabata et al., 1993.
^a In this column mainly local names of the vegetable/or animal drugs are given. If more than one local name is used for the same material, names are separated by (=) symbol. Where a local name is marked with (*), the vernacular name of the used part of vegetable/or animal drug is indicated.
^b Numbers referring to the collection sites of information are given under Fig 1.
^c Application: dec, decoction; ext, externally; inf, infusion; int, internally; +, together with; X, hybrid of; /, or.

more, 59.1% of the vernacular names in Table 1 are recorded for the first time.

The most frequently used folk remedies are those against skin problems including wounds, abscess, eczema, bleeding etc. (38.2% of all remedies). 21.2% of the remedies are used for the treatment of gastro-intestinal disorders including stomachache, peptic ulcers, diarrhea, hemorrhoids, and 8.2% of the remedies are used for the treatment of respiratory ailments such as common cold, cough and bronchitis. This pattern is similar to that observed in the neighboring provinces of this subdivision (Tabata et al. 1994). However, when compared to the Mediterranean subdivision where many herbal remedies are used against urinary troubles (i.e., kidney stone and dysuria) (Yeşilada et al. 1993, 1995), we recorded only two remedies (1.0% of all remedies) in our present study. This may suggest a low occurrence of urinary problems in the eastern areas of Anatolia.

Some plants listed in Table 1 have been recorded for the same purpose, such as two subspecies of *Plantago major* both used for the maturation of abscess (in 17 localities, 56.6% of the sites surveyed), and *Urtica* sp. for the treatment of rheumatism either by applying directly on the affected part to relieve pain or by drinking the decoction (used in 16 localities, 53.3% of the sites surveyed).

Species of the Asteraceae family are used frequently as herbal remedies (18 species belonging to 11 genera). Four different species of *Achillea* are called by the same vernacular name “kılıçotu” in different localities, but are used for different purposes. In contrast, two species, *Centaurea balsamita* and *Tanacetum balsamita*, also called as “kılıçotu,” are used for similar purposes. On the other hand, roots of five different boraginaceous plants, with the same vernacular name, are used for the same purpose. It is also recorded that people commonly use a mixture of herbs called “tırpan kiri” (dirt of scythe), which is collected from the tip of a scythe, to stop bleeding when they cut their fingers during harvesting.

It should be noted that folk medicines of animal origin (15 remedies from 10 animals) are more frequently used in these eastern areas than in other regions of Turkey. As an interesting example, a slice of trout “alabalık” is said to be applied on a wrongly fixed bone fracture and kept for one day to fix the bone again correctly.

A similar practice as well as the treatment of calcinosis is reported for other parts of Anatolia, (Tabata et al. 1993).

As it is observed commonly in other subdivisions of Turkey, inhabitants of this subdivision also use simple prescriptions with only one or two ingredients. However, traditional practitioners and herbalists sometimes use more complex formulae. Information obtained directly from the former during the present field trip is included in Table 1, as their method of medical treatment can be regarded as a traditional therapy. In Ağrı, (location 1), we interviewed a female traditional healer who is said to be an expert in the treatment of gangrenous wounds. This information is inherited from her mother. For this treatment, she ties a tourniquet on the upper part of the affected extremity then incises the wound to drain the dirty blood out. She then applies paunch (stomach or derma) which is removed from a freshly sacrificed sheep tightly on the wound and kept overnight. After removing the paunch, a poultice prepared from *Malva neglecta* is applied for protection of the wound. For rapid recovery of gangrenous wounds, as well as other wounds, pounded snail is applied on the wound. For the treatment of any internal disease that could not be diagnosed, she uses a concoction of several herbs: Pünk (*Mentha longifolia*), tirşu (*Rumex* sp.), belhavz (*Plantago major*), gezgezk (*Urtica pilulifera*), gelenkotu (*Eryngium bilardieri*) are boiled in a large container, and the patient takes a bath in this extract. This treatment is repeated for a few days. As a supplementary treatment, tea prepared from a concoction of pünk, belhavz, dölik (*Malva neglecta*) and gezgezk is taken.

In Location 3, we interviewed a male traditional practitioner in his house. In addition to remedies obtained from local plants, he also prepares some mixtures of drugs obtained from Akhtars (herbalists). As an example, the following prescription is said to be effective against hemorrhoids, jaundice, bronchitis and used as a panacea for any kind of internal diseases. [Latin names of the crude drugs in this recipe are given as referred by book of Başer, Honda and Miki (1986)]: ketehindi [*Acacia catechu*], zencefil [*Zingiber officinale*], dar-ül fül fül [*Piper longum*], karanfil [*Eugenia caryophyllata*], nar [*Punica granatum*], beyazkök [?], yel cevizi [?], beyaz şap [white alum], yeşil şap [green alum], limontuzu [citric acid]. All the materials are

mixed and boiled with pomegranate juice and condensed over the fire to one glass. One teaspoonful of the extract is taken on an empty stomach. This causes vomiting 15 min after administration, but the patient will feel better. The powdered mixture prepared without addition of pomegranate juice is blown into the throat through a reed to treat throat cancer or wounds in the mouth.

In Doğu Bayazıt, Karabulak Village (Ağrı province), a famous herbalist who was educated in Cairo and employs Islamic medicine told us the following Turkish names of crude drugs which he purchases from local Akthars. [Latin names of these plants are tentatively given according to Başer, Honda and Miki (1986)]. Since the purpose of this study is limited to folk medicine applied by people and traditional practitioners, the information obtained in this interview is not been included in Table 1.

CRUDE DRUGS

- Adaçayı [*Salvia triloba* (Lamiaceae)], herbs, infusion, as sudorific, against amenorrhea, to treat oligospermia.
- A concoction of anason [*Pimpinella anisum* (Umbelliferae)], fruits, and sinameki [*Cassia angustifolia* (Leguminosae)], leaves, decoction, used as a laxative.
- Biberiye [*Rosmarinus officinalis* (Lamiaceae)], leaves, infusion, against headache, used as a sedative.
- Ceviz [*Juglans regia* (Juglandaceae)], leaves, decoction, to purify blood, for the treatment of leukemia.
- Çoban çantası [*Capsella bursa-pastoris* (Cruciferae)], herbs, for treating kidney ailments.
- Hatmi [*Althea officinalis* (Malvaceae)], flowers, decoction, against amenorrhea, stomach ache, as gargle for bronchitis.
- Havacıva [*Alkanna tinctoria* (Boraginaceae)], root bark, ointment, for wound healing.
- Isırgan [*Urtica dioica* (Urticaceae)], herbs, decoction, for treating eczema, pruritus, stomach disorders.
- Kantaryon [*Erythraea centaurium*, (Gentianaceae)], flowers, infusion, used as a tonic, against diarrhea, and as a sedative.
- Karabaşotu [*Lavandula stoechas* (Lamiaceae)], herb, infusion, used against epilepsy, insomnia, cancer, arteriosclerosis.
- Kışniş [*Coriandrum sativum* (Umbelliferae)],

fruits, against headache, used as a sedative, as an abortifacient, and for pimples.

Mürver [*Sambucus nigra* (Caprifoliaceae)], flowers, infusion, used for diabetes.

Oğulotu [*Melissa officinalis* (Lamiaceae)], herbs, infusion, used for stomach and cardiac disorders.

Ökalyptus [*Eucalyptus camaldulensis* (Myrtaceae)], leaves, decoction, for treating sinusitis, bronchitis, toothache.

Ökseotu [*Viscum album* (Loranthaceae)], herb, decoction, for treating jaundice, hepatoprotective.

Papatya [*Matricaria chamomilla* (Asteraceae)], flowers, decoction, for the treatment of gastrointestinal affections.

Reyhan [*Ocimum basilicum* (Lamiaceae)], herb, infusion, used for headache and as an appetizer.

Rezzaniye [*Foeniculum vulgare* (Umbelliferae)], fruits, infusion, used against amenorrhea, furuncles.

Şahtere [*Fumaria officinalis* (Fumariaceae)], herb, decoction, used to dilute blood, as an antimicrobial, for stomach ailments and arteriosclerosis.

Üvez [*Sorbus domestica* (Rosaceae)], leaves, decoction, used for diabetes.

Yavşan [*Artemisia spec.* (Asteraceae)], herb, decoction, used to treat migraine.

CONCLUSION

Although traditional medicine is still widely practised throughout the region, it is being rapidly replaced by modern medicine and pharmaceuticals. Furthermore, owing to the migration of rural people from villages to large cities in recent years, particularly to Istanbul, knowledge of traditional therapy is being lost rapidly. In Erzincan, Ardahan, and Kars provinces, this problem is especially evident. For the sake of preserving traditional medicinal knowledge, immediate action must be taken to record folk knowledge of traditional medicine and therapy before it disappears completely from Turkey.

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"Ayahuasca," the South American Hallucinogenic Drink: an Ethnobotanical and Chemical Investigation¹

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The Sharanahua and Culina, small Indian tribes located in the southwestern Amazon basin, use a hallucinogenic drink for medicinal and social purposes. This decoction, called "Ayahuasca" in Peru, is prepared from Banisteriopsis Caapi stems and Psychotria sp. leaves. These plants have been botanically identified on the basis of voucher herbarium specimens and investigated for alkaloid content by means of a gas chromatography-mass spectrometry technique. A list of other occasional plant admixtures is given. Harmine, Harmaline, Tetrahydroharmine, Harmol and 6-Methoxytryptamine have been found in Banisteriopsis Caapi. Dimethyltryptamine, Monomethyltryptamine and 2-methyl-1,2,3,4-tetrahydro- β -carboline have been found in Psychotria viridis and Psychotria carthagenensis. Harmine, Harmaline, Tetrahydroharmine and Dimethyltryptamine have been found in the drink. Quantitative calculations show the amount of each alkaloid administered in the Ayahuasca drink.

Introduction

Some traveller who may follow my steps, with greater resources at his command, will, it is to be hoped, be able to bring away materials adequate for the complete analysis of this curious plant.

—Richard Spruce

In the Peruvian Amazon, the Quechua expression "Ayahuasca" (literally "vine of the souls") is used to designate a hallucinogenic beverage prepared from the malpighiaceae vine *Banisteriopsis Caapi* (Spruce ex Griseb.) Morton. In Brazil, the drink is called "Caapi" and in Colombia "Yagé." Many ethnographical, botanical, chemical and pharmacological aspects concerning this decoction have recently been reviewed (18, 22, 41, 42, 53, 56). Several other plants may be mixed with the Ayahuasca during its preparation (47) and may change the hallucinogenic properties of the drink. However, even though the nature of the principal alkaloids of Ayahuasca is known, there is a

lack of correlation in previous works between what can be observed in the field, the botanical identification and the chemical examination.

During a visit to the upper part of the River Purús in 1968, one of us (L.R.) obtained information concerning the local use of Ayahuasca and collected botanical material for analysis and voucher specimens. This work was carried out together with I. Rüf, a Swiss anthropologist. Identification of the botanical material was made by H. V. Pinkley (Botanical Museum of Harvard University).

This paper deals with the indigenous use of and the chemical analysis of the material.

The Upper River Purús: Social Context

The Purús is a tributary of the Amazon and rises in the humid tropical forest of southwestern Peru not far from the Peruvian-Brazilian border.

The settling of the Indians is recent. The people who worked on the borders of the river around 1860 disappeared after the crash of the rubber boom. The first groups who afterwards came to settle on the upper Purús about 25 years ago did not find any people there. They came

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from the north, hoping to find machetes and guns near more navigable rivers. Now Sharanahua, Cashinahua, Yaminahua, Marinhua, Mastenahua, Tshandinahua, Amahuaka, Masco, and Culina live there.

All the groups mentioned, with the exception of the Culina, speak the Pano language, and all of them understand each other. Only the Cashinahua are a little different because of their isolation (33). The Culina speak an Arawak language, which increases the social distance from other groups. The villages are separated from each other by at least half a day's canoe trip; visits are frequent.

The settlement of the villages changes often in order to avoid decrease of game. There is also a tendency to approach Esperanza, the mestizos village. The groups differ considerably but their material culture is very similar: they are cultivators, hunters and fishermen. They are strongly and rapidly influenced by contact with civilization. Transformation in living patterns can already be noticed — introduction of work, debt contracting, resulting changes due to the introduction of new technical devices, young people learning Spanish. On the whole, a movement from primitive collectivism towards individualism according to the Peruvian model is noticeable. In addition, these groups have also suffered from various epidemics and are often not sufficiently numerous to live in the traditional way. However, many of their cultural traditions are still alive, among them the use of Ayahuasca.

The Use of Ayahuasca

The following remarks are based on personal experience and observations made during a visit to the Culina Indians of the village of Zapote from March to November, 1968, and intervening visits to the Sharanahua of Marcos. Supplementary information about the Sharanahua has been taken from Siskind (61).

The inclusion of the ethnological obser-

vations was made possible through the collaboration of Miss I. Rűf.

All the Pano groups use Ayahuasca frequently. The Culina do not use it in the traditional manner.

Medical Use. This may be the traditional use, reserved for the witch doctor or shaman. He takes the drug when the illness of his patient cannot be treated by medicine and when the origin of the illness may be magical. Guided by the dreams related to him by the sick person, the shaman makes a "trip" under the influence of the drug. He interprets the visions in order to detect the cause of the illness and fights it symbolically. He tells about the fight, singing to the patient to liberate him from the evil. His song refers to the mythical content which he shares with the sick person.

Social Use. In addition to the above therapeutic use of the drug, there is also a profane one — Sharanahua and Culina men take the drink in order to have visions. They meet in the evenings in front of the house of the man who has prepared the drink. All men do not participate: some disapprove, others are afraid of the effects. There is no prestige connected with the drinking.

The women are not allowed to take the drug, since it is supposed to hurt them. However, the prohibition is not very strict nowadays. Children and adolescents do not use it. The drug can be taken up to 10 times a month and, frequently, even more often. Only difficulty in procuring the ingredients limits the meetings.

The Sharanahua can very well control the effects of the drug. If their health or work demand it, they can easily abstain from taking it.

It is possible that the frequency of the social use corresponds to the degree of anguish of the group or the individual. The situation of the Indian can be unsafe — he notices that his way of life is changing while the traditional obligations of society are still weighing upon him. It seems as if a well guided Ayahuasca

experience brings the participants close together. It permits certain common values to be confirmed because the mythological content of the visions is still prevailing deep in their souls. It may be that the Culina are looking for this type of experience in their present situation but do not succeed in finding it because of the lack of this common base.

Plants Used in Preparing the Drug

1. *Banisteriopsis Caapi* (Malpighiaceae) (Table II)

The mestizos use the name Ayahuasca for both the vine and the drink, as do the Purús inhabitants. The Sharanahua call it "Shuri," "Rambi" or "Undi"; the first word is the most common. The Culina use the word "Tsipu" but prefer "Rami," which is borrowed from the Pano language. The Indians distinguish between three kinds of Ayahuasca: the red, the black and the white. This distinction is based more on the difference in color of the drink than on the appearance of the plant. Some Indians, like the Peruvian mestizos, make no distinction between the red and the white drink.

Peruvian Name	
Black	= Ayahuasca negro
Red	= Ayahuasca blanco
White	= Ayahuasca blanco
Sharanahua	
Black	= Shuri fisopa
Red	= Shuri oshinipa
White	= Shuri oshopa
Culina	
Black	= Tsipu tsueni
Red	= Tsipu wetseni
White	= Tsipu makuni

2. *Psychotria* sp. (Rubiaceae) (Table III)

In this whole region the stems of Ayahuasca are always blended with the leaves of *Psychotria* sp. According to informants, "one sees nothing" without this admixture.

The Sharanahua distinguish between at least two kinds of *Psychotria* without the general "Kawa" term:

- (1) Batsikawa
- (2) Pishikawa or Kawa kui

"Batsikawa" is said to be inferior to "Pishikawa": it gives an impression of coldness and produces fewer visions. The Culina know of two species too, but they do not distinguish between them by name: this one is "Rami appane" ("Appane" means "leaves"). One of the species is also weaker and gives an impression of coldness. Sharanahua and Culina translate "Kawa" and "Rami appane," respectively, by the Peruvian name of "Chacrana."

3. Admixtures

Banisteriopsis Caapi and *Psychotria* sp. are considered by Sharanahua and Culina to be the basic ingredients. Other plants, listed in Table I, are sometimes added to or taken together with the beverage.

Preparation of the Drug

The preparation of the drug varies little from one village to another. The person who has found the ingredients of the drink in the forest usually undertakes its preparation. This takes place in front of his house. Fifteen stems of *Banisteriopsis Caapi* (approx. 60 cm long and 1 to 4 cm in diam.) are crushed with a short thick pole and cut into pieces 10 cm long. In a 15 litres metal vessel reserved for this purpose, layers of vine are packed alternating with leaves of *Psychotria* sp., until the vessel is full. Ten litres of water are added, and the mixture is boiled for one hour. The vegetable sediments are eliminated by filtering through a strainer. As soon as it is cold, the decoction is ready for consumption.

The above procedure gives the Sharanahua sufficient drug for three days, but according to information, the Ayahuasca loses its strength rapidly and cannot be kept for a very long time.

TABLE I
PLANT ADMIXTURES TO *Banisteriopsis* AND *Psychotria* IN THE AYAHUASCA BEVERAGE

Botanical Name	Sharanahua	Culina	Uses
<i>Lygodium venustum</i> Sw. Schizaceae No. 13 & 14	Tchai del monte	Rami	A handful of leaves is added to the decoction. Sharanahua think that it makes the drink stronger. The plant is not cultivated but grows in old gardens and in the forest.
<i>Phrygilanthus eugenioides</i> (HBK) Eichl. Loranthaceae No. 15	Miya	Kohobo	A quantity of leaves similar to that of <i>Chacruna</i> is boiled with Ayahuasca or the juice of this wild plant may be drunk at the same time as Ayahuasca.
<i>Lomariopsis japurensis</i> (Mart.) J. Sm. Polypodiaceae No. 17 & 18	Shoka	Dsuui-tetseperi	Only the Sharanahua add 3 to 4 branches. This plant is very abundant in the jungle.
<i>Opuntia</i> sp. Cactaceae (No voucher sp.)	Tchai		This cultivated cactus is considered by the Sharanahua to be hallucinogenic. It was brought to Marcos from the Amahuaca living on the Inuya River. The mixture of Ayahuasca and Tchai is very strong and is never used medically (cf. 36).
<i>Epiphyllum</i> sp. Cactaceae No. 19	Pokere	Wamapanako	The Sharanahua add only one leaf to the drug or else drink the unboiled juice together with Ayahuasca.
<i>Cyperus</i> sp. Cyperaceae No. 12	Shakoshejetti	Anubedsetetseperi	This cultivated plant is called piri-piri in Peru. The Sharanahua put some of the powdered rhizome in the decoction. The Culina have received the plant from the Amahuaca and use it only when hunting peccary because of its special odour (cf. 22 page 85).

TABLE I (Continued)

Botanical Name	Sharanahua	Culina	Uses
<i>Clusia</i> sp. Guttiferae	Miya	Tara	The Sharanahua chew one or two leaves during the Ayahuasca session. This wild plant may also be boiled with the drink.
? Acanthaceae No. 16	Hwandarao	Uratetseperi	Only the Sharanahua add a handful of leaves to the Ayahuasca. The Culina use the leaves to darken their teeth as a sign of beauty.
? Bignoniaceae (?) No. 19	Potshesheti		A few leaves may be added to the drink or boiled apart. The Sharanahua put drops of this liquid in their eyes.
<i>Datura</i> sp. (Probably <i>D. suaveolens</i>) Solanaceae (No voucher sp.)	Wahashupa		The Sharanahua informed us that they put a few leaves of this plant (which they find up river) into Ayahuasca. The Peruvian name is "toe." The drink becomes then very toxic.
<i>Nicotiana</i> sp. Solanaceae (No voucher sp.)		Tsina	Customarily, the Indians smoke all night long, when taking Ayahuasca. Some shamans occasionally drink the juice of tobacco leaves from plants grown in their gardens.
<i>Capsicum</i> sp. Solanaceae (No voucher sp.)		Catsi	The Culina sometimes eat this fruit together with Ayahuasca. In Peru this cultivated plant is called "aji."
? (No voucher sp.)	Yamba		Powdered bark of this tree is added to the drink and boiled with it.
? (No voucher sp.)	Yambabusi		Idem

TABLE II
DISTRIBUTION OF ALKALOIDS IN AYAHUASCA PLANTS

Species	Part of the Plant	Alkaloids		
		Dry Weight	Alkaloids	%
<i>Banisteriopsis Caapi</i> (Spruce) Morton No. 1	Stem	0.11	Harmine	91
			Tetrahydroharmine	1
			232	1
Tsipi makuni Culina Indians Zapote, 22,7.68 Upper Purus River	Branches	0.14	Harmine	90
			Tetrahydroharmine	1
			Harmaline	1
			232	2
	Leaves	0.28	Harmine	94
	Branches Freeze-dried (Feb. 70)	0.19	Harmine	77
			Tetrahydroharmine	6
			Harmaline	Trace
			232	1
	Roots Freeze-dried (Feb. 70)	0.92	Harmine	40
			Tetrahydroharmine	44
			Harmaline	15
			232	Trace
<i>Banisteriopsis Caapi</i> (Spruce) Morton No. 2	Stem	0.11	Harmine	96
			Tetrahydroharmine	2
			Harmaline	1
			232	Trace
	Branches + Leaves Freeze-dried (Feb. 70)	0.35	Harmine	69
			Tetrahydroharmine	11
			Harmaline	4
			Harmol	3
			232	4
	Roots Freeze-dried (Feb. 70)	1.95	Harmine	41
			Tetrahydroharmine	37
			Harmaline	17
			6-MeO-T	Trace
<i>Banisteriopsis Caapi</i> (Spruce) Morton No. 3	Stem	0.21	Harmine	68
			Tetrahydroharmine	22
			Harmaline	6
			232	3
	Root	0.64	Harmine	90
			Tetrahydroharmine	7
			Harmaline	3
	Leaves	0.45	Harmine	92

TABLE II (Continued)

Species	Part of the Plant	Alkaloids		
		% Dry Weight	%	
(Continued)	Seeds	0.91	Tetrahydroharmine	1
			Harmaline	Trace
			232	Trace
			Harmol	Trace
			Harmine	58
			Harmol	8
<i>Banisteriopsis Caapi</i> (Spruce) Morton No. 4 Shuri oshinipa Sharanahua Indians Marcos, 8.8.68 Upper Purus River	Stem	0.20	Harmine	84
			Tetrahydroharmine	9
			Harmaline	1
			232	3
	Root	0.71	Harmol	2
			Harmine	78
			Tetrahydroharmine	15
			Harmaline	5
	Leaves	0.70	232	1
			Harmine	78
			Tetrahydroharmine	2
			Harmaline	Trace
<i>Banisteriopsis Caapi</i> (Spruce) Morton B. Holmstedt and D. Martin Piturijacu Mestizos near Iquitos	Stem	0.57	232	Trace
			Harmine	64
			Tetrahydroharmine	29
			Harmaline	5
	Branches	0.37	6-MeO—T	Trace
			Harmine	64
			Tetrahydroharmine	17
			Harmaline	4
			232	2
			Harmine	62
			Tetrahydroharmine	24
			Harmaline	7
Cultivated Ayahuasca Tarapoto, Perú August, 1967	Stem	0.83	232	1
			Harmol	Trace
			6-MeO-T	1
			Harmine	64
			Tetrahydroharmine	28
<i>Banisteriopsis Caapi</i> (Spruce) Morton Pinkley No. 445 Ecuador	Stem	0.35	Harmaline	7
			6-MeO-T	Trace
			232	1
			Harmine	64
			Tetrahydroharmine	28

TABLE II (Continued)

Species	Part of the Plant	Alkaloids % Dry Weight	Alkaloids	%
<i>Banisteriopsis</i> sp. (Probably) G. T. Prance No. 7498 Acre Territory Brazil	Stem	0.31	Harmine	87
			Tetrahydroharmine	6
			Harmaline	3
			232	2
<i>Banisteriopsis</i> sp. G. Baer Kamalampi Piro Indians Peru, 1968	Stem	0.65	Harmine	42
			Tetrahydroharmine	47
			Harmaline	9
			232	2
<i>Banisteriopsis</i> sp. G. Baer Matsigenga Indians Perú, 1968	Stem	0.65	Harmine	67
			Tetrahydroharmine	21
			Harmaline	8
<i>Banisteriopsis</i> sp. (Probably) Shuri oshinipa Sharanahua Indians Marcos 7.10.68 Upper Purús River	Stem	0.41	Harmine	88
			Tetrahydroharmine	8
			Harmaline	3
			232	1
<i>Banisteriopsis</i> sp. (Probably) Shuri fisopa Sharanahua Indians Marcos, 7.10.68 Upper Purús River	Root	0.61	Harmine	74
			Tetrahydroharmine	19
			Harmaline	6
			232	1
<i>Banisteriopsis</i> sp. (Probably) Shuri oshopa Sharanahua Indians Marcos, 7.10.68 Upper Purús River	Stem	0.20	Harmine	80
			Tetrahydroharmine	16
			Harmaline	2
			232	1
			Harmol	Trace
<i>Banisteriopsis</i> sp. (Probably) Tukondi Marinahua Indians Conta, 13.10.68 Upper Purús River		0.20	Harmine	95
			Tetrahydroharmine	3
			232	1
			Harmol	Trace
<i>Banisteriopsis</i> sp. (Probably)	Stem	0.05	Harmine	71
			Tetrahydroharmine	Trace
			232	Trace

TABLE II (Continued)

Species	Part of the Plant	Alkaloids % Dry Weight	Alkaloids	%
(Continued)				
Ayahuasca Mestizos Jenaro Herrera, Ucayali River 10.11.68	Stem	0.39	Harmine	74
			Tetrahydroharmine	4
			232	3
			Harmol	16
	Leaves Freeze-dried (Feb. 70)	1.90	Harmine	85
			Tetrahydroharmine	5
			Harmaline	Trace
			Harmol	2
Banisteriopsis sp. (Probably)	Leaves	0.25	Harmine	98
			Harmol	Trace
Cielo-Ayahuasca or Ayahuasca blanco Mestizos Iquitos 5.11.68				

Taking the Drug

As soon as night falls, the men assemble and sit down around a fire. Before he drinks, each man blows over the drug and utters a short prayer that he will see well. They drink in turn a calabazo of liquid, approximately 200 ml, and continue to talk quietly. Later, other men join them. Gradually, those men who took the drink first feel the effect (20 to 30 min.). They spit, belch and vomit it. The vomiting is considered necessary to produce visions and is supposed to be purifying.

The singing begins as soon as hallucinations set in. The singers have the same rhythm, and the music is harmonic, although the words and melodies are different. The words describe the visions individually. The song serves to guide the vision and to give unity to the group. The individual songs turn at a counterpoint and return now and then. Those used to taking the drug see to it that the beginners do not get a bad experience. They try to

comfort them by taking their heads in their hands and by blowing tobacco smoke on them. Sometimes they present to them a perfumed plant (*Ocimum micranthum* — Labiatae. *Rivier & Rüf 11*), if the anguish seems too great. A similar practice was observed in the Acre territory in Brazil (50, 51).

The effect of the drug lasts about two hours, and it can be prolonged until dawn by taking more drug (about 100 ml) every hour. The last members of the drug group retire usually around 2 A.M. They are accustomed to go to their work the following day.

The preparations by the Culina differ only slightly, and their drug is weaker than that of the Sharanahua. The Culina do not sing but sit in a row in the darkness while talking. They seem to be much less affected by the drug, and they are themselves rather troubled by their neighbors' customs and are curious to try the experience (60). For them, taking the drug is a

TABLE III
DISTRIBUTION OF ALKALOIDS IN PSYCHOTRIA PLANTS

Species	Part of the Plant	Alkaloids % Dry Weight	Alkaloids	%
<i>Psychotria viridis</i> R. and P. No. 9	Leaves	0.11	MMT	85
			MTHC	12
Kawa Kui Sharanahua Indians Marcos, 7.10.68				
<i>Psychotria viridis</i> R. and P. No. 7	Leaves	0.34	DMT	99
			MMT	Trace
			MTHC	Trace
Rami appani Culina Indians Zapote, 22.7.68				
<i>Psychotria carthagenensis</i> Jacq. No. 8	Leaves	0.66	DMT	99
			MMT	Trace
			MTHC	Trace
Rami appani Culina Indians Zapote, 4.9.68				
<i>Psychotria bacteriophylla</i> Lausanne	Leaves	-	-	-
<i>Psychotria emetica</i> Borneo-Paris	Leaves	-	-	-
<i>Psychotria undulata</i> Borneo-Paris	Leaves	-	-	-
<i>Psychotria</i> sp. Culina Indians Zapote	Leaves Freeze-dried Feb. 70	-	-	-

marginal custom and badly accommodated to the life of the group.

The Effects of Ayahuasca

When used socially, the visions vary greatly. From the information that we obtained, however, some distinct points emerge. The drug lets one see unknown places; permits one to enter into contact with absent or dead people; shows terrifying animals, serpents, jaguars; shows aero-

planes, objects of high value; sometimes reveals the future.

The contents of the visions told to anthropologists are not nearly so rich as those coming forth in the songs. It may be that the most profound experiences cannot be communicated to another person. The visions correspond usually to traditional aspirations or new ones (such as aeroplanes). One of the characteristics of the drug is the creation of great suggestibility.

Personal Experiences

L.R. and I.R. had similar experiences; they took the drug at the same time and together with a group of natives. At Zapote on two occasions the effects were not very noticeable. (For composition of the drug taken, see Table IV: *Tsipu makuni*, Zapote 22.7.68, and *Tsipu tsueni*, Zapote 13.10.68).

At Marcos, the first time, sample collection was not possible. Physical sensations came at first: heaviness in the back of the neck, a feeling of movement in the stomach, a sensation of numbness and tingling in the extremities "as if there were ants in the body," heat, nausea which disappeared at the beginning of the first visions, yawning, salivation. At first a shining blue veil (the Sharanahua name is *Rami*) seemed to come between the subject and his surroundings; thereafter, objects in lively colors appeared. This rather geometrical vision was followed by pseudo-hallucinations: hands, faces, and fire lost their identity by being transformed into fantastic beasts, snakes, tigers. Other visions were far from reality — Dutch fishermen, trip over New York. These visions seemed like waves and corresponded to the intensity of the song. The visions were accompanied by a feeling of "harmony," desire to laugh and to communicate, by the visualization with great lucidity of "intellectual problems" and by a strong impression of verbal and nonverbal communications with the Indians. The visions faded during 4 hours after emptying the first calebass (two were taken, the second one hour after the first). The visions and sensations diminished but the "harmony" and the "spiritual lucidity" remained. They gradually subsided in the course of the next day. The contact with the companions of the night appeared to remain intimate and full of complicity even the day after the taking of the drug. A light pleasant fatigue followed and there were no side-effects.

Three months later, a second experience proved to be extremely violent, pain-

ful and quite negative compared to the first one. (For composition of the drug taken, see Table IV, *Shuri fisopa*, Marcos 7.10.68.) The physical sensations were considerably stronger — nausea, pain in the muscles, accompanied by compulsive and uncontrollable movements (swaying, hand moving), a feeling of coldness, fascination by the fire at the same time that its smoke was intolerable. These phenomena were connected with a feeling of anguish which was in absolute contrast to the pleasant feeling and the freedom during the first experience. Visions of the same type as experienced during the preceding experiment were, however, now terrifying, and the song accentuated the anguish. The Sharanahua tried to drive away disagreeable feelings by words and gestures which were meant to guide the visions, but the relief was of short duration. After the first dose, the experience lasted approximately 2 hours, but this period seemed interminable. Communications with other people were prevented. This experience left one with a feeling of fatigue and frustration and also a lasting fear that it might return.

It has not been possible to find out whether the Sharanahua have experienced this taking of the drug as painful.

Experimental

A. List of Abbreviations

DMT	= N,N-dimethyltryptamine
MMT	= N-monomethyltryptamine
6-MeO-T	= 6-methoxytryptamine
5-MeO-T	= 5-methoxytryptamine
Harmine	= 1-methyl-7-methoxy- β -carboline
Harmaline	= 1-methyl-7-methoxy-3,4-dihydro- β -carboline
Tetrahydroharmine	= 1-methyl-7-methoxy-1,2,3,4-tetrahydro- β -carboline
Harmol	= 1-methyl-7-hydroxy- β -carboline
MTHC	= 2-methyl-1,2,3,4-tetrahydro- β -carboline

TABLE IV
ALKALOIDAL CONTENT IN AYAHUASCA PREPARATIONS

Vernacular Name and Origin	Plants	Total Alkaloids (% w/v)	Alkaloids	%	mg./100 ml
Tsipu makuni (White Ayahuasca) Culina Indians Zapote, Perú, 22.7.68	<i>Banisteriopsis Caapi</i> <i>Psychotria viridis</i> (No. 7)	0,064	Harmine Tetrahydroharmine DMT	26 11 21	17 7,2 13
Tsipu tsueni "dsati" (Crude Black Ayahuasca) Culina Indians Zapote, Perú, 9.10.68	<i>Banisteriopsis</i> sp. <i>Psychotria</i> sp. <i>Lygodium venustum</i> (No. 13)	0,013	Harmine Tetrahydroharmine Harmaline 232	62 18 4 6	Not drunk
Tsipu tsueni "pekanani" (Boiled Black Ayahuasca) Culina Indians Zapote, Perú, 9.10.68	<i>Banisteriopsis</i> sp. <i>Psychotria</i> sp. <i>Lygodium venustum</i> (No. 13)	0,038	Harmine Tetrahydroharmine Harmaline DMT 232	47 6 4 31 6	18 2,3 1,5 12 2,3
Tsipu tsueni "dsati" (Crude Black Ayahuasca) Culina Indians Zapote, Perú, 13.10.68	<i>Banisteriopsis</i> sp. <i>Psychotria</i> sp.	0,005	Harmine Tetrahydroharmine Harmaline 232	56 11 Trace 10	Not drunk
Tsipu tsueni "pekanani" (Boiled Black Ayahuasca) Culina Indians Zapote, Perú, 13.10.68	<i>Banisteriopsis</i> sp. <i>Psychotria</i> sp.	0,015	Harmine Tetrahydroharmine Harmaline DMT 232	43 10 Trace 36 6	6,6 1,5 5,4 0,9

TABLE IV (Continued)

Vernacular Name and Origin	Plants	Total Alkaloids (% x/v)	Alkaloids	%	mg./100 ml
Shuri fisopa (Tukondi) (Black Ayahuasca) Sharanahua Indians Marcos, Perú, 7.10.68	<i>Banisteriopsis Caapi</i> (No. 3) <i>Psychotria viridis</i> (No. 9) <i>Lygodium venustum</i>	0,049	Harmine Tetrahydroharmine Harmaline DMT 232	37 20 2 20 20	18 9,8 1,1 9,8 9,8
Shuri oshinipa (Red Ayahuasca) Sharanahua Indians Marcos, Perú, 11.10.68	<i>Banisteriopsis Caapi</i> (No. 4) <i>Psychotria viridis</i> (No. 5) <i>Lygodium venustum</i>	0,052	Harmine Tetrahydroharmine Harmaline DMT 232	37 14 3 30 16	19 7,2 1,6 16 8,2
Shuri (Ayahuasca) Sharanahua Indians Marcos, Perú, 1.8.68 Received from J. Siskind (61)		0,034	Harmine Tetrahydroharmine Harmaline DMT 232	22 9 1 41 16	7,1 2,9 0,3 14 5,2
Kamalampi (Ayahuasca) Piro Indians Rio Urubamba, Perú Received from G. Baer (5)	<i>Banisteriopsis</i> sp. Horowa leaves = Chacruna	0,058	Harmine Tetrahydroharmine Harmaline 232	21 40 4 6	

TABLE V
PREVIOUS CHEMICAL ANALYSES OF AYAHUASCA, CAAPI OR YAGÉ

Author	Year	Type of Analyses	Vernacular Name Identification Existence of Her- barium Specimen	Compounds Isolated	Ref.
Zerda Bayón	1905		Yagé (decoction)	Telepathine	(63)
Fischer Cardenas	1923	Micro-Chem. react.	Yagé <i>Aristolochia</i> sp.	Telepathine	(21)
Seil and Putt	1924		Caapi <i>Banisteria Caapi</i>	Three alkaloids (Impure)	(59)
Barriga Villalba	1925	Elementary anal. Micro-chem. react.	Yagé <i>Prestonia amazonica</i>	Yageine and Yagenine	(6)
Albarracín	1925	Elementary anal. Micro-chem. react.	Yagé <i>Prestonia amazonica</i>	Yageine and Yagenine	(3)
Michiels and Clinquart	1926	Micro-chem. react.	Yagé <i>Prestonia amazonica</i>	Yageine and Yagenine	(39)
Clinquart	1926	Elementary anal. Micro-chem. react.	Yagé (decoction)	Yageine	(13)
Perrot and Raymond Hamet	1927	Micro-chem. anal.	Yagé <i>Banisteria Caapi</i>	Telepathine (Yageine)	(46)

TABLE V (Continued)

Author	Year	Type of Analyses	Vernacular Name Identification Existence of Her- barium Specimen	Compounds Isolated	Ref.
Lewin	1928	Elementary anal. Micro-chem. anal.	Yaque, according to Merck <i>Banisteria Caapi</i>	Banisterine	(35)
Wolfe and Rumpf	1928	Elementary anal. Degrad. to Harmol	Yaque, according to Merck Malpighiaceae	Harmine = Yageine	(62)
Elger	1928	Elementary anal.	Yagé <i>Banisteria Caapi</i>	Harmine + one alkaloid	(20)
Brückl and Mussnug	1929	Elementary anal. Crystal charact.	- - -	Banisterine = Harmine	(9)
Dalmer	1929	U. V. spectra	- - -	Banisterine = Harmine	(15)
Keller and Gottauf	1929	Elementary anal. Micro-chem. react.	Ayahuasca <i>Banisteria</i> sp.	Harmine-like alkaloid	(32)
Arispe	1938	Elementary anal. Micro-chem. react.	Ayahuasca <i>Banisteria Caapi</i>	Yageine (and Yagenine)	(4)
Chen and Chen	1939	Elementary anal. Derivatives U. V. Spectra	Caapi <i>Banisteria Caapi</i> Yes	Harmine	(12)

TABLE V (Continued)

Author	Year	Type of Analyses	Vernacular Name Identification Existence of Her- barium Specimen	Compounds Isolated	Ref.
Mors and Zaltzman	1954	Paper chrom. Electrophoresis Micro-chem. react.	Ayahuasca <i>Banisteria Caapi</i>	Yageine (Harmine)	(40)
Costa	1954	Micro-chem. react.	Yagé <i>Banisteria Caapi</i>	Yageine	(14)
Hochstein and Paradies	1957	Paper chrom. U.V. or I.R. spectra	Ayahuasca <i>Banisteria Caapi</i>	Harmine, Harmaline and d-tetrahydroharmine	(27)
Der Marderosian et al.	1968	Paper chrom. Thin layer chrom.	Yagé <i>Banisteriopsis Caapi</i> Yes	Harmine and Harmaline	(16)
Schultes et al.	1969	GC-MS GC	Caapi <i>Banisteriopsis Caapi</i> Yes	Harmine	(58)
Der Marderosian et al.	1970	Thin layer chrom.	(Ayahuasca) <i>Banisteriopsis</i> sp. Yes	Harmine and Harmaline	(17)

B. Material (Tables I-IV)

The botanical material and drink preparations were collected during the summer of 1968. The plant material was dried in the air without exposure to the sun, which exposure is said by Indians to destroy the power of the drug. 4-Hydroxy-benzoic acid methylester (Nipagin M) was added to the beverage to prevent fermentation (approximately 1 g/100 ml).

Some samples of *Banisteriopsis Caapi* were collected around Jenaro Herrera, a mestizo Peruvian village along the Ucayali River. The *Cielo-Ayahuasca* plant was taken from the Botanical Garden of the Amazon Natural Drug Co. in Iquitos, Peru.

Piro and *Matsigenga* materials were collected by G. Baer, Museum für Völkerkunde, Basel, in 1968-1969, along the Urubamba River.

Other specimens of *Banisteriopsis* were obtained from G. T. Prance, New York Botanical Garden; R. T. Plowman and R. T. Martin, Harvard Botanical Museum; H. V. Pinkley, Harvard Botanical Museum; B. Holmstedt, Department of Toxicology, Karolinska Institutet, Stockholm; and R. T. Martin, Harvard Botanical Museum.

Freeze-dried *Psychotria bacteriophylla* was obtained in the greenhouses of the City of Lausanne (Switzerland). The leaves of *Psychotria emetica* and *P. undulata* were obtained from "Jardin des Plantes," Paris, by Holmstedt in 1970. They were originally collected in Borneo.

Some living plants of *Banisteriopsis* and *Psychotria* were brought back from Peru to Switzerland and are now growing in the hot greenhouses of the city of Lausanne. Part of those plants were freeze-dried just before extraction.

Most of the plants of the collection of Rivier and Ruff were identified by H. V. Pinkley. Voucher herbarium specimens of this collection are deposited in the Botanical Museum of Harvard University. Some duplicates (Nos. 1, 5, 8, 14, 15, 18, and 21) are in the Gray Herbarium of Harvard University. One sample of No. 8 is in the

New York Botanical Garden. Other samples of the specimen are deposited in the Conservatoire et Jardin Botanique de la ville de Genève, Switzerland (1 to 9, 13, 15, 17, 18, 20 and 21).

C. Isolation of Alkaloids

The powdered plant material (1-200 g) was stirred with methanol over night at room temperature. The solution was filtered and the residue was re-extracted with methanol for 4 hours. After filtration, the solution was evaporated under reduced pressure. The residue was shaken with 200 ml 2N H_2SO_4 , centrifuged, and the solid extracted again with 100 ml 2N H_2SO_4 . This was repeated once more. The acidic solutions were extracted with three 100 ml quantities of $CHCl_3$. The chloroform layer was rejected and the aqueous solution was made alkaline (pH = 10) by adding solid Na_2CO_3 .

The basic compounds were then extracted from the aqueous solution with $CHCl_3$ three to five times, depending upon the quantity of starting material. The $CHCl_3$ solutions were combined and dried with anhydrous Na_2SO_4 . The organic solution was evaporated under reduced pressure after filtration.

The liquid samples were acidified directly with H_2SO_4 .

D. Gas Chromatography (GLC)

Gas chromatographic analyses were performed with an F & M Model 400 apparatus equipped with a hydrogen flame ionization detector system.

The column support, 100-120 mesh Gas Chrom CLP, was size-graded, acid-washed, and silanized, according to the method described by Horning et al. (30). The coating was applied by the filtration technique (29).

The stationary phase was 5% OV-17 in a 2,25 m \times 3,2 mm glass tube. The column was operated at 210° for *Banisteriopsis* and drink, and at 190° for *Psychotria*. The injector block and the detector chamber were kept at 50°C above the oven temper-

ature. Carrier gas was nitrogen. Flow was 25 ml/min. Samples were injected in a 1/1 methanol-chloroform solution with a 0-10 μ l Hamilton syringe.

E. Gas Chromatography-Mass Spectrometry (GLC-MS)

The principles of the technique have been described earlier (28). The mass spectrometry work was carried out with LKB 9000 gas chromatograph-mass spectrometer. The ion source was 270°, the electron energy was 70 eV and the electron ionization current 60 μ A, respectively.

The column consisted of a 2,5 m \times 3,2 mm glass tube with the same stationary phase as the GC work, but the column support was Varaport-30.

Separation of the alkaloid mixture was made at 250° for *Banisteriopsis* and drink, and at 230° for *Psychotria*.

Injector block and "molecule separator" were maintained 30° above the column temperature. Helium was used as the carrier gas.

F. Quantitative Estimation

The amount of alkaloids in the dried plant material and in the drink and the percentage of each alkaloid in the alkaloid mixture were determined by planimetry using Harmine as a standard.

G. Reference Compounds

DMT	= Schuchardt, Munich, Germany
6-MeO-T	= Schuchardt, Munich, Germany
Harmine	= Fluka, Bucks, Switzerland
Harmaline	= Aldrich, Milwaukee, Wisconsin
Harmol	= Aldrich, Milwaukee, Wisconsin

Di-Tetrahydroharmine was obtained from Dr. Bernauer, Hofmann-La Roche, Basle, Switzerland.

MMT bioxalate was kindly placed at our disposal by Dr. A. Hofmann, Sandoz A. G., Basle.

2-Methyl-1,2,3,4-tetrahydro- β -carboline has been synthesized earlier (2).

Results

The results of the analysis of Ayahuasca (*Banisteriopsis* sp.) and Chacruna (*Psychotria* sp.) and of the drug are shown in Tables II-IV. In each case, the identity of the peaks of the gas chromatograms has been corroborated by mass spectra obtained with the combination instrument. This method assures complete identity with the reference compounds and gives direct evidence of identity. The complete botanical name is given only when the plant has been identified on the basis of the voucher herbarium specimen. In all cases we have indicated the vernacular name and the Peruvian name given by the Indians.

In some extracts, the mass spectra of peaks corresponding to the retention time of reference compounds was impossible to record because of the small amount available for injection of the sample and the relatively high background. In mass fragmentography (or Multiple Ion Detection), the mass spectrometer is used as a gas chromatographic detector which continuously monitors 1 to 3 selected mass numbers of compounds eluted from the gas chromatographic column. [For description and applications of this technique, see (24) and (25)]. Focussing upon mass number 198, mass fragmentograms of alkaloidal extracts of *Banisteriopsis* and the beverage were registered in view of controlling the presence of Harmol.

Concerning alkaloidal extracts of *Psychotria* sp. and beverage, the ions m/e 188, 174 and 186 were brought alternatively into focus to detect the occurrence of DMT, MMT and MTHC, respectively.

Discussion

Analysis of *Banisteriopsis* (Table II)

As shown in Table V, the most recent analytical work on an authentic specimen of *B. Caapi*, strangely enough, was made in 1968 on the material sent by R. Spruce from Brazil in 1852 and later kept in the Royal Botanical Garden at Kew. This ma-

TABLE VI
MASS SPECTROMETRIC DATA FOR REFERENCE COMPOUNDS

Compound	Mass spectrum, lit. ref. and major peaks at m/e
DMT	Ref. (28) 58 (base peak), 103, 115, 130, 143, 188 (M+)
MMT	Ref. (28) 44 (base peak), 103, 115, 130, 131, 145, 174 (M+)
MTHC	Ref. (2) 143 (base peak), 78, 102, 115, 186 (M+)
6-MeO-T	This paper 160 (base peak), 30, 117, 145, 146, 161, 190 (M+)
5-MeO-T	Ref. (2) 160 (base peak), 30, 117, 145, 146, 161, 190 (M+)
Harmine	Ref. (28) 212 (base peak and M+), 106, 169, 197
Harmaline	This paper 214 (base peak and M+), 169, 170, 186, 198, 199, 212, 213
Tetrahydroharmine	Ref. (28) 201 (base peak), 101, 172, 187, 216 (M+)
Harmol	This paper 198 (base peak and M+), 99, 115, 169, 170, 197

terial contained only Harmine (58). Earlier, Der Marderosian et al. (16) found Harmine and Harmaline in a voucher specimen identified by R. E. Schultes.

Only in 1939 did Chen & Chen publish a convincing analysis showing the presence of Harmine in the stem, leaves and roots of an authentic specimen of *B. Caapi* (12). This is, however, contested by Cuatrecasas, who believes that the samples represent *B. inebrians* (22). Schultes (in conversation) agrees with Cuatrecasas. According to Deulofeu (18), Elger analyzed a plant material identified as *B. Caapi* and found that it contained Harmine (20). It should be noted that the much-quoted investigation by Hochstein & Paradies (27) concerns a material the botanical identification of which later proved to be based solely on the vernacular name of the plant (57). These chemists isolated three β -carbolines: Harmine,

Harmaline and d-Tetrahydroharmine.

In all the samples analyzed by us, we have found the β -carbolines: Harmine, Harmaline and Tetrahydroharmine, and, in addition, Harmol, and 6-MeO-T (Figs. 2 & 3). It should be noted that 6-MeO-T has a mass spectrum similar to that of 5-MeO-T but that the latter compound has a different retention time. In our own investigation, we have demonstrated, also, that the composition of stems from other parts of the Amazon differ quantitatively only slightly from those found in the southwestern parts (Table II).

Harmine, Harmaline and Tetrahydroharmine have been isolated from a number of other plants (54). Harmol has previously been isolated from *Passiflora incarnata* L. (37, 38) and from *Zygophyllum fabago* (8).

Other *Banisteriopsis* species that have been investigated contain DMT and

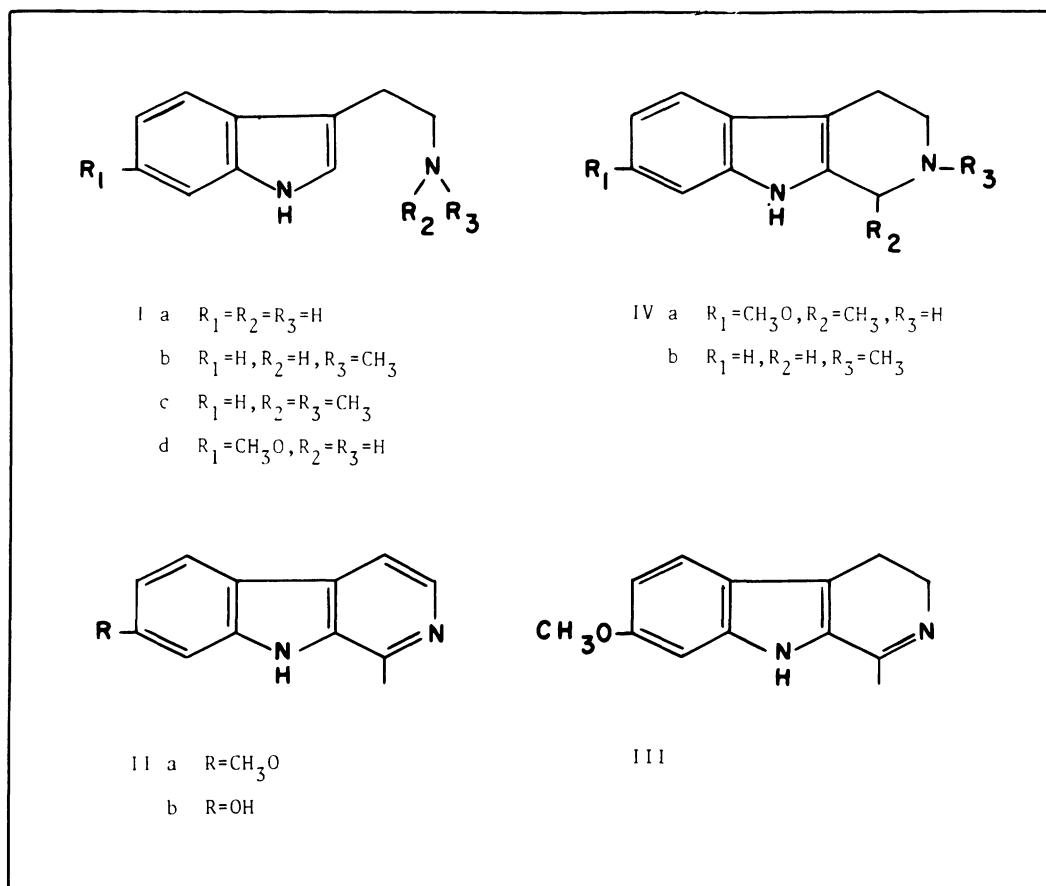


Fig. 1. Ia. Tryptamine; Ib. Monomethyltryptamine; Ic. Dimethyltryptamine; Id. 6-Methoxytryptamine. IIa. Harmine; IIb. Harmol; III. Harmaline; IVa. 1,2,3,4-Tetrahydroharmine; IVb. 2-Methyl-1,2,3,4-tetrahydro- β -carboline.

MTHC. They may be said to serve as admixtures of the basic Ayahuasca drink (47).

O'Connell & Lynn isolated and tentatively identified Harmine in *B. inebrians* in 1953. The botanical identification was made from material of the stem and leaves of the plant. No voucher specimens were, however, reported (44). Sixteen years later, O'Connell (43), searching for the possible occurrence of other alkaloids in the same plant, found caffeine. This unique report on the presence of xanthine compound in Malpighiaceae may be questioned. At the time, Schultes gave O'Connell trunks of two plants to work with,

Banisteriopsis and *Paullinia Yoco*. *P. Yoco* is used as a stimulant and is rich in caffeine. A confusion of the two collections may have occurred (Schultes, letter of July, 1971).

Psychotria (Rubiaceae) (Table III)

Der Marderosian et al. (17) have isolated DMT and two other non-indole alkaloids from leaves of *Psychotria viridis*. One of them was tentatively identified as dehydro-DMT by mass spectrometry: no spectrum of this compound was, however, published. In the same work, another *Psychotria* is reported to contain DMT only. A third specimen of *Psychotria*

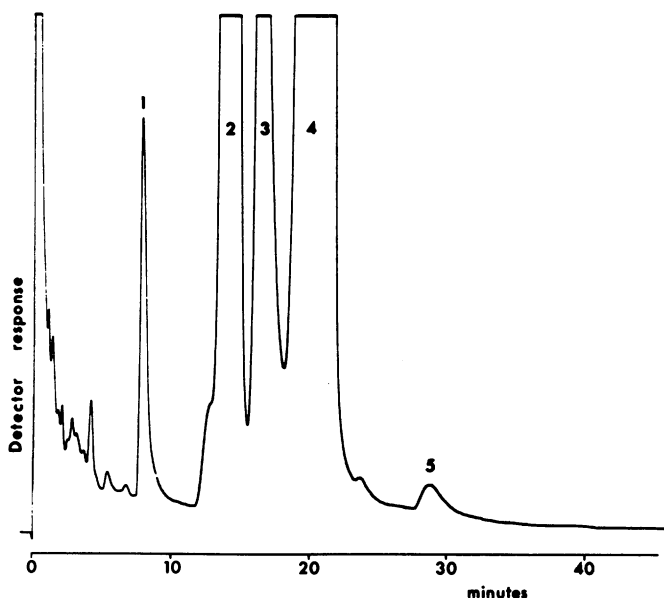


Fig. 2. Gas chromatogram of alkaloidal fraction from *Banisteriopsis Caapi* (Spruce) Morton, obtained from R. T. Plowman and R. T. Martin, Tarapoto, Perú. GLC conditions: 5% OV-17 on 100-120 mesh Gas Chrom CLP; temp. 210°.

1 = 6-MeO-T.; 2 = Tetrahydroharmine; 3 = Harmaline; 4 = Harmine; 5 = Harmol.

leaves was totally devoid of alkaloids. The Indians mix all three of these *Psychotria* species with Ayahuasca, according to Pinkley (47).

Our own analysis of the leaves of *Psychotria viridis* showed the presence of substantial amounts of DMT and traces of MMT and MTHC (Figs. 4 & 5). When DMT is not present, we find instead MMT and MTHC. The molecular weight of MTHC is 186 and its mass spectrum is presented in Fig. 5. Dehydro-DMT has the same molecular weight. The mass spectrum of "alkaloid 186" proves, however, that it is not an indole with an open side chain. The β -carboline structure was found to be correct by comparison with synthetic reference compound. The interpretation of the structure is in agreement with the interpretation of Agurell et al. (2) and Johns et al. (31).

Psychotria carthaginensis contains a larger quantity of alkaloids than *P. viridis*, practically all DMT (Table III). The other species of *Psychotria*, (*P. emetica*, *P. bac-*

teriophylla and *P. undulata*) contain neither indoles nor β -carbolines. Freeze-dried *Psychotria* sp., used with Ayahuasca by the Culina — which was grown in a greenhouse — contains none of the three alkaloids.

DMT has already been isolated from a number of plants (54). MMT or Dipterine has been identified in a few plant families (52). Analyses of hallucinogenic plants used by South American natives have shown the presence of MMT in the leaves of *Banisteriopsis Rusbyana* (1), in *Virola theiodora*, *V. rufula* (2), (10), in *Virola calophylla* (1), (28), in *Anadenanthera (Piptadenia) peregrina* (1), (28), (34). MTHC has been isolated, together with other simple indole compounds, from *B. Rusbyana* (1). MTHC is also to be found in *Arthropodium leptocladum* and in *Gymnacranthera paniculata* (31).

The use of the expression "Chacrana" has spread all along the Ucayali between Pucallpa and Iquitos among the mestizos. Del Castillo (11) gives, on pages 73-74 of

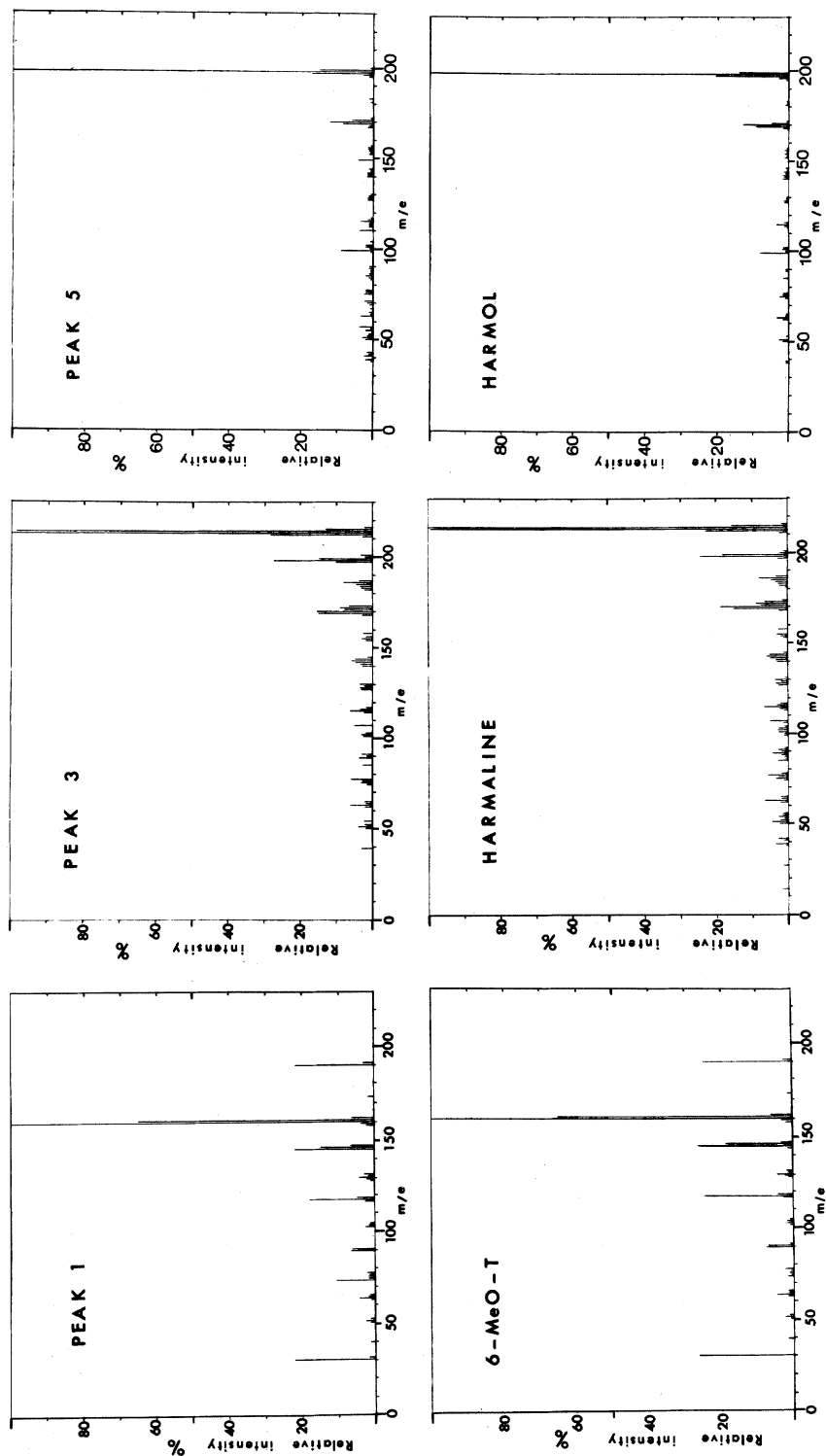


Fig. 3. Mass spectrometric recording of compound in peak effluents from alkaloid fraction (Fig. 2) and reference compounds.

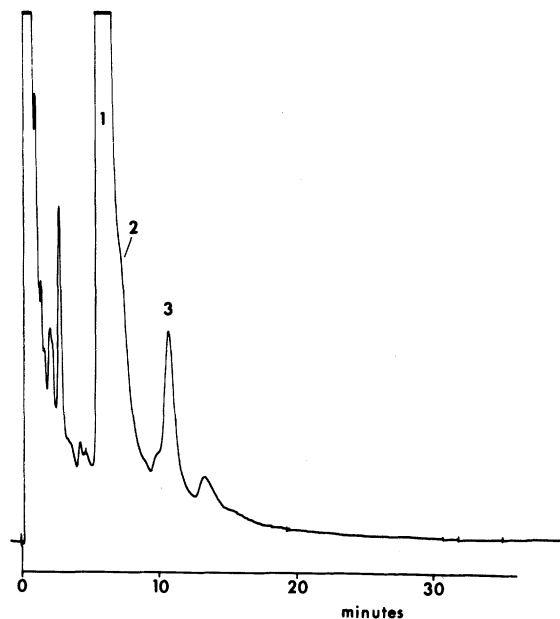


Fig. 4. Gas chromatogram of alkaloid fraction from *Psychotria viridis* R. et P., Culina Indians, Purús River, Perú. (No. 7). Conditions: same as Fig. 2 but temp. 190°. 1 = DMT; 2 = MMT; 3 = MTHC.

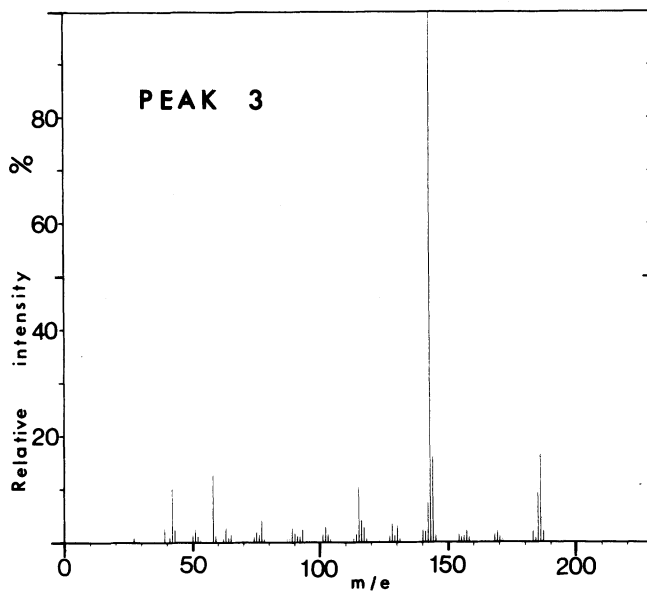


Fig. 5. Mass spectrometric recording of compound in peak effluent No. 3 from alkaloidal fraction (Fig. 4). Reference compound in (2).



Fig. 6. Gas chromatogram of alkaloid fraction from *Ayahuasca* beverage (*Shuri oshinipa*), *Sharanahua* Indians, Purús River, Perú. Conditions: same as Fig. 2.

1 = DMT; 2 = Tetrahydroharmine; 3 = Harmaline; 4 = Harmine.

his thesis, a description of the Chacruna plant, which he saw 7 km from Iquitos:

La Chacruna es un arbusto de 3 a 4 metros de altura, de raíz napiforme, tallo leñoso, cilíndrico, de diez o más centímetros de diámetros. La corteza es de color verde, ligeramente oscuro, con manchas ligeramente blanquecinas y distribuidas como pequiñas aéreas de aspecto geográfico, do modo que en conjunto nos recuerda la piel de una serpiente. Las hojas son de forma lanceolada, alargadas, enteras, de pecíolo muy corto. Son hojas peninerviadas, con más de diez nervaduras secundarias. El haz es de color verde oscuro, lustroso; el envés es de un verde claro, opaco. Por su disposición en el tallo son opuestas y cruzadas, forman como manojos foliares en las ramas. Las hojas miden 13 a 15 cm de largo (incluyendo el pecíolo) por 4.5 cm en su parte

más ancha. El pecíolo mide unos 0.5 cm de largo más o menos. La inflorescencia es compuesta, definida. El fruto es pequeño, de 4.5 por 5 mm, epicarpio de color rojo como el cerezo cuando está maduro; es una drupa, encierra dos semillas que nos recuerdan el café. Las semillas son pues dos, que se abren al igual que el café, convexas en su parte dorsal y aplanadas en su parte ventral, por la que se unen; unidas dan una forma ovoide, de 4 por 4.5 mm. Se parece al café. La testa (cubierta externa del epispermo) es de color blanco amarillento quando está fresca, ligeramente pardo cuando esta seca, y de aspecto rugoso en su parte dorsal.

Le llaman también yagé en Iquitos. Su habitat es el llano amazónico. Nosotros lo encontramos en las selvas de la circunscripción de San Juan, al este del caserío del mismo nombre, a uno siete u ocho kilómetros al S.O.

de la ciudad de Iquitos, en un terreno inculto, entre otros árboles y arbustos de la selva, con vegetación no muy tupida, en terreno arenoso obscuro, escasamente arcilloso y húmedo, en "altura," como se dice en el argot regional. Nosotros lo encontramos con frutos por los meses de Febrero, Marzo y Abril.

Nos informan que hay otra variedad de chacruna que también asocian a la ayahuasca, pero, la que acabamos de describir es la que se usa en Iquitos y la que hemos empleado en nuestras experiencias.

No doubt it is a question of a rubiaceoous plant, quite probably a *Psychotria*.

In 1929, two German chemists received from Bolivia Chacruna leaves, an admixture of Ayahuasca, but no chemical analyses were made (32). The leaves were, however, identified: it was a rubiaceoous, probably *Mapouria formosa* (26).

The Piro of Rio Urubamba use also the Chacruna leaves (Horowa) to heighten the effect of a *Banisteriopsis* drink (Kamalampi). This plant was not botanically identified (5). Dobkin de Rios (19) quotes in a note that Chacruna (used by the mestizos of Iquitos) is *B. Rusbyana*. Schultes has a specimen of Chacruna from another collector near Iquitos and identified it as *B. Rusbyana* (Schultes, personal communication). Chacruna appellation can apply, probably, to both *Psychotria* and *Banisteriopsis*.

In view of the foregoing, it cannot be assumed that the decoction of the Yagé leaves, analyzed by Hochstein & Paradies (27) and found to contain DMT, was made from a *Psychotria* or *Banisteriopsis* plant. There is nothing to prove it, although these samples, which come from Rio Napo "near Iquitos," have the same vernacular name and have been shown indirectly to contain the same principal alkaloids.

Analysis of the Drink (Table IV)

Only a few chemical analyses of the beverage have previously been carried out (12, 13, 17, 27, 55). Hochstein & Paradies (27) declared that Harmine, Harmaline and Tetrahydroharmine were present in

the aqueous extract "as used by the natives" and that the concentrations of Harmaline and Tetrahydroharmine were greater than in the plant. Der Marderosian et al. (17) have isolated DMT, "much Harmaline and a little Harmine" from "nixi pae" of Cashinahua. This Ayahuasca was prepared with the stem of *Banisteriopsis* sp. and the leaves of two species of *Psychotria* (not completely identified).

Of the sundry Ayahuasca drinks that have been analyzed in this study, only two have a botanical origin firmly established. As shown in Table IV, the several alkaloids identified in the plants are not present in the drink. Only DMT, Harmine, Harmaline and Tetrahydroharmine were detected in the decoction (Fig. 6).

On the gas chromatograms of the drink, as well as on those of the *Banisteriopsis* alkaloidal fractions, one component emerging just before Tetrahydroharmine still has to be identified (Fig. 2 & 6). This compound, probably a β -carboline, has a molecular weight of 232 (M+) and other peaks at 57 (base peak), 189, 176, and 174. Work on its identification is in progress.

Some clinicians have experimented with these substances in man by oral administration.

In 1929, Beringer & Wilmanns (7) used 0.02 g Harmine kreatinine capsules 4 to 6 times a day to treat Parkinson's disease.

Halpern (23) took up to 0.04 g per os in self-experiments. The effects came slowly after 10 to 15 minutes and optimal action was reached after two hours.

Pennes & Hoch in 1957 (45) reported no hallucinogenic effects from doses under 960 mg, although physical symptoms began with a 400 mg dose.

Naranjo (41) found Harmaline-HCl to be hallucinogenic at dosages above 4 mg/kg by mouth, which is about one half the threshold level of Harmine-HCl. The onset of the effects of those compounds was about one hour after ingestion by mouth.

Racemic Tetrahydroharmine-HCl, up

to the amount of 300 mg by mouth, was administered by Naranjo (41) to a volunteer who reported that, at this dosage level, there were subjective effects similar to those which he experienced with 100 mg of Harmaline.

Summing up from Table IV, we have calculated that an Indian, after drinking a portion of Ayahuasca (200 ml), has taken an average of 30 mg of Harmine, 10 mg of Tetrahydroharmine, and 25 mg of DMT.

In view of these results, new pharmacological experiments for a better understanding of the hallucinogenic action of Ayahuasca seem necessary.

Concluding Remarks

1. The South American drink called Ayahuasca studied here was collected among the Sharanahua and the Culina Indians of the upper Purús River in Amazonian Perú.

The present investigation established that this drink is prepared basically from the malpighiaceae *Banisteriopsis Caapi* and the rubiaceae *Psychotria viridis*. Sometimes Culina Indians used *P. carthaginensis* instead of *P. viridis*.

It is to be remembered that *Psychotria viridis* and *Banisteriopsis Rusbyana*, which contain closely related compounds, are used as additives to Ayahuasca by some native tribes (47).

Other ingredients are occasionally added to the decoction. They are not considered to be essential by the Indians. Some of those additives contain chemical constituents which could possibly add to or alter the hallucinogenic effects of the drink. They belong to the Solanaceae: *Nicotiana* sp., *Datura* sp. and *Capsicum* sp. *Nicotiana* and *Datura* have been already reported to be admixtures in other places (56). *Brunfelsia* is also frequently added in the Ecuadorian and Colombian Amazon along the eastern slopes of the Andes.

Other plants belonging to different families have not been reported before: *Lygodium venustum* (Schizaeaceae),

Phrygilanthus eugenioides (Loranthaceae), *Lomariopsis japurensis* (Polypodiaceae), *Epiphyllum* sp. and *Opuntia* sp. (Cactaceae), *Cyperus* sp. (Cyperaceae) and *Clusia* sp. (Guttiferae). In other areas of the Amazon basin, *Prestonia amazonica*, *Malouetia Tamaquarina* (Apocynaceae) and *Alternanthera Lehmanii* (Amaranthaceae) are known to be added as admixtures together with *Banisteriopsis* (56). There are still numerous additives to the Ayahuasca drink unidentified or known only from native names.

2. By means of analytical tools giving direct evidence of identification of the alkaloids, we have definitively established that *Banisteriopsis Caapi* contains mainly Harmine, Harmaline, Tetrahydroharmine but also two minor compounds: Harmol and 6-Methoxytryptamine.

In the same way, both *Psychotria viridis* and *P. carthaginensis* have been shown to contain Dimethyltryptamine with traces of Monomethyltryptamine and 2-methyl-1,2,3,4-tetrahydro- β -carboline.

3. Even though many self-experiments with Ayahuasca preparation have been made with Indians, no composition of the beverage dosage of the alkaloids has previously been reported at the same time.

In this paper, qualitative and quantitative analyses of fully described Ayahuasca are presented: DMT, Harmine, Harmaline and Tetrahydroharmine were detected and identified. The relative concentrations of each compound present in the drugs are different from those present in the ingredients, *B. Caapi* and *P. viridis*.

An Indian, after drinking a portion of Ayahuasca of 200 ml, has taken an average of 30 mg of Harmine, 10 mg of Tetrahydroharmine, and 25 mg of Dimethyltryptamine.

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NOTE ADDED IN PROOF

After submission of the manuscript three papers with direct connection with this investigation have been published:

- Ghosal, S., U. K. Mazumder & S. K. Bhattacharaya 1971. Chemical and Pharmacological Evaluation of *Banisteriopsis argentea* Spring ex Juss. *J. Pharm. Sci.* 60: 1209-1212.
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THE RITUAL USE OF *BRUGMANSIA* SPECIES IN TRADITIONAL ANDEAN MEDICINE IN NORTHERN PERU¹

VINCENZO DE FEO

De Feo, Vincenzo (*Dipartimento di Scienze Farmaceutiche, Università degli Studi di Salerno, Via Ponte don Melillo, 84084 Fisciano, Salerno, Italy; e-mail defeo@unisa.it*). THE RITUAL USE OF *BRUGMANSIA* SPECIES IN TRADITIONAL ANDEAN MEDICINE IN NORTHERN PERU. *Economic Botany* 58(Supplement):S221–S229, 2004. This paper reports the use of *Brugmansia* species (*Solanaceae*) in traditional practices of shamans (*curanderos*) of Northern Peruvian Andes. The field study permitted the classification of a number of species and/or their hybrids used for both curative and psychotropic activities. There is evidence of a folk systematics in this genus that constitutes a very important phenomenon for its therapeutic-divinatory, phytotherapeutical, and ritual (in initiation and black magic rites) uses.

Key Words: Ethnobotany; traditional Andean medicine; *Brugmansia*.

Since ancient times humans have utilized plants not only as food sources, but also as part of their ritual and healing practices. In most pre-literate cultures, along with medicinal plants, a central role in therapeutic rites is played by “magical plants,” most of which are represented by hallucinogenic species. The use of these plants is socially accepted and often there is a close relationship between the supernatural and the altered states of consciousness produced by hallucinogenic plants. These species, in fact, are seen as intermediaries between the human world and that of supernatural forces. It was hypothesized that psychoactive plants have been responsible for the origin of the concept of the sacred (Furst 1972; La Barre 1972). For these reasons, the knowledge and the practice of using plants for healing rituals assumed a special characteristic: often it is secretly kept and conveyed by shamans, priests and other religious figures, who are very knowledgeable about herbs and who combine their botanical, phytotherapeutical and toxicological knowledge with religious elements and rituals based on magic, superstition and ancestral beliefs (De Feo 1992). Several objectives of the rituals are centred on psychoactive species. Sacramental practices imply the intention of establishing contact with the sacred to produce ecstasy. Divinatory rituals are carried out

quickly to enable the shaman to detect the origin and treatment of a disorder or the whereabouts of a missing object or person. Finally, in the context of magic and sorcery, there are rituals for the purpose of inflicting harm, purification, and exorcism, which involves the internal or external use of plants (Diaz 1979).

In rural communities of the Northern Peruvian Andes the shaman (*curandero*) assumes a pivotal role; he is considered an intermediate between our world and the world of spiritual forces and is an expert on medicinal, harmful and psychotropic species used to awaken religious spirits or to gain altered states of mind (De Feo 2003). The Andean shamans associate the action of these plants with a supernatural depersonalization or dissociation of body and spirit. This conception has been reported for other cultures (McLaughlin 1973).

Reported in this study are the plants used by the *curanderos* of the Northern Peruvian Andes in a high-altitude lake area that stretches from the city of Ayabaca (about 2900 m above sea-level) to Lake Prieta. It is important to emphasize that this area is a sacred zone, claimed to be very effective for therapeutic-magic rituals, due to the presence of particularly strong spiritual forces (De Feo 1992, 2003; De Feo et al. 2002).

The most important psychoactive plants in traditional practices of the Northern Peruvian Andes are the cacti *Trichocereus pachanoi* Britt. et Rose and *T. peruvianus* Britt. et Rose (San

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Pedro). These cacti contain mescaline (Agurell 1969; Poisson 1969) and other phenethylamine derivatives (Shulgin 1979; Smith 1977). The use of San Pedro cactus has been fairly well documented in the scientific literature on Andean shamanism in Northern Peru (De Feo 2003; Polia 1988).

Very few reports are available in the ethnobotanical literature on other hallucinogenic plants that are commonly used in association with San Pedro cacti. Recently, we reported the use of some hallucinogenic plants in magic-therapeutic practices of Northern Peru (De Feo 2003). Among these the most important appeared to be the use of species belonging to the genus *Brugmansia*, known locally as *mishas*.

This paper focuses on the use of *mishas* for therapeutical and divinatory purposes in the provinces of Ayabaca and Huancabamba, Department of Piura.

METHODS

This field study was carried out for two consecutive years in the Provinces of Ayabaca and Huancabamba, Department of Piura, Northern Peru, in a zone between 4° 30'–5° 41' latitude S and 80° 1'–79° 20' longitude E. The altitude ranged from 2000 to 3700 m above sea level.

Information was gathered through interviews with *curanderos* and through participation in the harvesting, preparation and administration of the vegetal drug in therapy. Samples of *Brugmansia* species utilized in traditional therapy were collected for possible phytochemical and/or pharmaceutical studies. A set of voucher herbarium specimens (identified by initials and listed in parentheses following common names in this paper) has been deposited in the Pharmaceutical Botany Chair at the University of Salerno, Italy. Taxonomic determinations were performed at the herbarium of the Museo de Historia Natural, Lima.

RESULTS

Andean shamans in Northern Peru (*Maestros curanderos*) use the word *misha* to refer to plants belonging to the Solanaceous genus *Brugmansia* (but also to the *Datura* genus) utilized in special rites. One of these *mishas*—*floripondio* or *huarhuar*—was identified in 1959 by the ethnobotanist C. Friedberg (1959) as *Datura arborea* L., with no further specifications. Later, in 1961–1962, the same expert identified some *mishas* as being *Brugmansia* spp. (Friedberg

1963) and suggested that there may be an etymological link between the word *misha* and the terms *mits-kay* or *mets-kway*, indicating a *Brugmansia* species used by the Inga-speaking Indians in the Sibundoy valley (Southern Colombia). Another hypothesis is that the name *misha*, given to plants of the genus *Brugmansia* (and less frequently of the genus *Datura*) by Andean *curanderos*, probably comes from the Quechua. In modern Quechua in Cajamarca, *misha* means “variegated thing” (Quesada 1976). In contemporary shaman vocabulary, *misha* is also used for the San Pedro cacti with twin-colored flowers (red and white and white and purple), but is also commonly used as a synonym for hallucinogenic plant (Polia 1987). The *curandero* is often called *enmishado*, to show that he is receptive to the effects of *mishas*. In Huancabamba, *misha* is also a grain of maize with dark blue or reddish-brown stripes, and is considered a good-luck talisman. The *maíz-misha* is part of a very old category of natural phenomena that, being outside the general rule, such as twin parts, double fruits, or larger than usual or strange-shaped stones, etc., is considered to have a spiritual power. Also according to Friedberg (1959, 1963), the word *floripondio* was used to designate *Brugmansia* species. It is, however, very old and goes back to the time of the Spanish Conquest. Bernabé Cobo (1653) used *floripondio* to describe *B. suaveolens*: “This flower is the biggest of all those produced by trees and bushes, is beautiful to look at and is white; it is a palm in length and five points bend back from the very wide mouth . . . Their fragrance is so strong and intense that the must be sniffed from afar rather than from near at hand and only one of these flowers in a room perfumes so much as to be irritating and usually produces a headache . . . Everyone, Spaniards and Indians included, calls (this plant) floripondio” (Polia 1988).

The *curanderos* on Northern Peru use *Brugmansia* species for the following purposes:

1. Therapeutic-divinatory. For this purpose leaves and flowers are used alone or with San Pedro cactus.
2. Phytotherapeutical. In this case the *Brugmansia* leaves are applied in various ways to the parts of the body affected.
3. Initiation rites. The juice, obtained by squashing particularly powerful wild *Brugmansia* species, is administered during spe-

cial initiation ceremonies, but only to shamans chosen on the grounds of psychophysical characteristics.

4. Illness. Given their strong and dangerous effects, *Brugmansia* species are only very rarely administered to sick people orally or in other ways.
5. Black magic. Brugmansias are used to bring out "damage by mouth." In this case massive doses often produce irreversible damage.

Here we report the circumstances and instructions for the use of a number of *mishas* that we documented in the provinces of Ayabaca and Huancabamba during our field work. The interviews have been transcribed and contain descriptions of relevant therapeutic and ritual prescriptions.

MISHA TORO CURANDERA OR FLORIPONDIO OR HUAHUAR

Brugmansia sanguinea (R. et P.) D. Don
Herbarium voucher DF/P/88/22; DF/P/88/30.

This plant is used externally (toxic internally) to relieve pain, especially in cases of arthritic inflammations and cramps. The ground leaves are wetted with alcohol or perfume and applied to the affected area overnight. Following this application, one must stay on a five-day diet without fats or meat. In addition, during this period, the patient should stay out of water (keep dry). The pulverized leaves are used as a vulnerary on sores and wounds. The tincture of leaves is claimed to have hallucinogenic effects when absorbed through the nasal mucous. The plant is also used during ritualistic ceremonies to help in divination.

"*Brugmansia sanguinea* is used to cure rheumatism and skin rash. When combined with wine, *agua florida* and *agua cananga* (perfumes), it is used to induce dreaming (infusion). Before going to sleep, two leaves of the *misha* are tied in a cross on the nape of the neck and forehead with a handkerchief. Upon awakening, one drinks the juice of white maize mixed in cold water with lime, sugar and honey. Fire is avoided for five days, and a *dieta de aliño* is followed, that is, mutton or chicken only, with no onions or red peppers. You mustn't drink alcohol or see water. It's only to be used at night. You mustn't *mal dormir* (sleep badly) afterwards, that is, have sexual relation with a woman. You can lose your senses (*trastornarse*) or

the effect can stop. Seeing water breaks the effect and may cause mental distress. Many visions appear, such as dreams about many lost people and things, often identifying their locations. Since the flower is the force of the plant, it should be put in sweet white wine and sipped (*singar*) once through each nostril. While the plant is being gathered, it should be sprinkled (*se escape*) with white sugar, wild honey and lime."

This *misha* is very helpful to "see": "You see a person with a good heart and one with an evil heart." By having its leaves tied in the shape of a cross on the forehead and nape, the plant is also used *para aclarar*, that is "to clear" the mind, which in jargon means "allows the vision." In the vision the spirit of the plant manifested itself as a bull (*toro*).

It is said that in gathering this plant, the hands must be free of onion, garlic, pig lard, salt, alcohol and red pepper. The best period for gathering is when the plant is in flower and during the full moon. The infusion of the plant must not be taken orally.

MISHA RASTRERA

Brugmansia insignis (Barb.Rodr.) Lockwood, hybrid
Herbarium voucher DF/P/88/27

The whole or shredded leaves of this plant are used to relieve pain in cases of traumatic or rheumatic suffering. Because of its toxicity the plant should not be taken internally, but its effect may be interrupted by an antidote, the *arranque*.

The name of this plant is associated with *rastrear* and *rastreo*, literally "to follow footsteps," a method of divination and shaman diagnosis of diseases using psychotropic substances. "It is used to *rastrear* illnesses and lost things and to foresee (*predestinar*) what will happen. The leaves are left to ferment in white wine for two days, after which one must drink a small glassful. The forehead, head, and nape of the neck are rubbed with the leaves from the infusion. One follows the same *dieta* as that for the *misha toro*. It is drunk at night, followed by drinking *arranque* in the morning. A weak person is given only one leaf; a stronger person is given one and half leaves. The leaves are rubbed (on the head), tied on with a handkerchief, while drinking the small glass and sipping through the nostril (*singar*). The plant has the same kind of leaves as the *misha toro*, but they are thinner,

with red, pink and white flowers. The plant must be sprinkled with sugar and wild honey before the leaves are gathered."

Other *curanderos* strengthen the solvent effect of the wine on the active agents in the leaves by adding sugar cane alcohol.

This strengthened plant is "used to enhance dreaming by the *curandero*. The leaves are arranged in the shape of a cross and tied on the forehead or the nape of the neck. After twenty-four hours the effect is broken (*se arranca*) like the other *mishas*. It's used separately from the San Pedro, which is taken by itself. This *misha* has white flowers. The tree grows up to three metres. The fruit is long and smooth as a cucumber. The best months to gather it are when it blooms, as the plant is stronger. It is gathered with the full moon and early in the morning before sunrise. It's used to find lost things."

MISHA GALGA

Brugmansia aurea Lagerheim
Herbarium voucher DF/P/88/28

The leaves, applied externally on aching body parts, are claimed to relieve pains. The plant is also used to treat headaches, by absorption of the tincture (made of two flowers and one leaf in 1 liter of alcohol) through the nasal mucous and at the same time by rubbing the head and limbs with the same preparation. The plant is considered one of most potent *mishas*. Because of its claimed high toxicity, the plant is rarely used.

In Spanish *galgo* is a hunting dog (from the old German *galgr*). We had surmised that *galga* had something to do with a "hunting dog," given that the latter follows the scent of its prey, just as the plant allowed the *curandero* to *rastrear*. Another hypothesis is that the name had nothing to do with a dog. It may be derived, therefore, from the Quechua *jalka*—"a cold high mountain area"—given that some *mishas* cannot be cultivated and have to be gathered in mountainous places where they grow in the wild, and also acquire greater magical properties because of their barren surroundings.

"It is used particularly for aches in the bones. It can be used with *timolina* (a disinfectant made from essence of thyme), *agua florida*, and alcohol, depending on the illness. The leaves are kept in an infusion and then tied with a bandage to the affected part of the body. The *misha*, *toro curandera*, is used mainly for treating the sick,

but *misha galga* is used for black magic purposes (*para la hechizería*), by sprinkling it with other plants such as rue and pronouncing the name of a person (the victim). For dreaming, only one leaf is tied to the forehead and used for *rastreo*. When gathering the herbs, they are offered, (because) the plants hear man and tremble. When they are offered they no longer do any harm (to those gathering them)."

The plant is also useful in divination: "to see one ties two leaves in a cross to the forehead and the nape of the neck, always with *agua florida* and *agua cananga*. You drink San Pedro (decoction) and that is when you tie the leaves. The plant has white, yellow, gold and purple flowers, hence, *misha* (variegated). After using it you drink *arranque* and follow the same diet as for *misha toro*."

"In Huancabamba some *curanderos* compare *huarhuar* (*Datura* sp.) with *misha*, but it isn't the same thing. The flower colour is a whitish yellow, melon color. While it is used like *misha curandera*, the therapeutical content of the *galga* is faster. This plant changes into a hunting dog (*perro galgo*)."

MISHA OCULTADORA

Brugmansia sp.
Herbarium voucher DF/P/88/39

"There is only one kind of flower but with different colors. This is the first plant to reply to all the questions you ask. You drink two (mac-erated) leaves in water from the Black Lagoon, leaving it to infuse for forty-three hours. You drink a little from a glass in the evening. It is called *ocultadora* because it hides the truth from liars. To see, you tie the leaves in a cross. You follow the same diet for three days as with the other *mishas* without looking at fire. In the morning you drink white maize (one of the parts of the *arranque*). You can pick it from six in the evening on. You must plant it and let it get used to the place so that it does what you want. The plant defends the house and people, but attacks anyone offending it. To gather it you make offerings of wine, honey, lime and sugar and you say to it: 'Respect all that I ask you'."

MISHA COLAMBO (SNAKE)

Brugmansia suaveolens (Willd.) Bercht. et Presl
Herbarium voucher DF/P/88/29

The leaves, whole or shredded or sometimes mixed with tobacco leaves (*Tabaco* = *Nicotiana*

tabacum L.; *Tabaco cimarrón* = *Nicotiana paniculata* L.), are used as a vulnerary for sores, ulcers and wounds that won't heal. The leaf decoction is used externally for poultices as an anti-inflammatory on traumatized body parts. The vapors of this decoction are used as a vaginal antiseptic in cases of dysmenhorrea and white secretions. The plant is claimed to be toxic if ingested.

The *colambo* is a kind of non-poisonous snake which, when attacked, whips its tail. "This *misha* is used for bathing and rubbing cures (*limpias*) for sores, swellings and non-scarring wounds, but also for inhalations and vaginal ablutions with leaves in hot water. It is boiled until the water turns green and the vapor is used for the vagina. It is also used for women who have had a cold in the womb (white secretions are held to be the effect of a "cold"). For rubbing it is used with *Timolina*, alcohol and vinegar. Leaves are tied on swellings that are painful and don't ripen. The same happens with wounds, but tobacco is added. You must never drink it. The tree is four metres high. It is the tallest *misha*. Like the *galga*, the flower is white. The fruit is like a cucumber, with a smooth thin green skin. It is used macerated in alcohol. The seeds are small and black, like *ají* (*Capsicum annuum* L.) seeds. When the flower wilts the seeds take the shape of the *colambo*. It changes into a *colambo* at twelve at night: if you go and take a leaf and you'll take the head of a snake. They are custodian plants (*cuidadoras*). At sowing time the soil is mixed with tobacco, alcohol and the blood of some animals, and a spell is cast (*se encanta*) with perfumes, saying that if someone goes to gather it, the plant will let him, but it will give the person a stomach-ache. Before gathering it, I bathe myself, otherwise I get a headache. After using the *misha*, an antidote must be drunk (*se arranca*)."

MISHA OSO (BEAR)

Brugmansia arborea (L.) Lagerheim
Herbarium voucher DF/P/88/32

The fresh leaves or their alcoholic tincture are used as a vulnerary and to cure pimples and other skin eruptions. It is claimed to be toxic if ingested and is considered the strongest *misha*. The leaves, whole or shredded, are also valued externally, by applying them to aching areas, in cases of rheumatic inflammations or other traumas.

"It has this name because when the flower wilts the seeds form the head of a bear. The flowers are the same (as the previous plant), but the colors are yellow, white and red. The seeds are arranged like those of the *ají rojoto* (a variety of *Capsicum annuum* L.) and the fruit is like those of the *ají rojoto*. When the illness is complicated, it is combined with leaves from the seven mishas and is rubbed on (*limpias*). They are used for white secretions or bleeding by vaporizing it and doing ablutions. Five leaves to one litre of water are boiled for half an hour to an hour. It can also be a custodian plant. It guards by making a bear appear beneath the tree and the bear is seen when you drink San Pedro (decoction). After using it you must drink *arranque*."

MISHA LEÓN (PUMA)

Brugmansia arborea (L.) Lagerheim
Herbarium voucher DF/P/88/32

The fresh leaves or their alcoholic tincture are used as a vulnerary and to cure pimples and other skin eruptions. The leaves, whole or shredded, are also valued externally, by applying them to aching areas, in cases of rheumatic inflammations or other traumas.

"The flower is light brown like chocolate. It is a small plant, about two metres high. Because it is the strongest, it is used for serious illnesses, healing any sore or wound. It's tied on to the affected part of the body, or rubbed, or the juice squeezed onto the wound with *Timolina* and alcohol. Afterwards the effect is interrupted (*se arranca*). It is also used to treat swellings or when nerves get numb. The macerated plant with alcohol is also rubbed on in the morning and in the evening. The flower is the shape of a puma's tail. It changes into a puma."

MISHA CURANDERA

Brugmansia candida (Pers.) Safford, hybrid
Herbarium voucher DF/P/88/26

Using fresh leaves and the tincture, the plant is valued as an analgesic against traumatic or rheumatic pains. The fresh leaves are placed on the aching part of the body for eight days, changing them every so often to keep the heated part moist. (When dry, the leaves lose most of their curative properties.) The tincture is also used to relieve headaches by absorption through the nasal mucous and simultaneously rubbing the head and limbs with the same preparation;

these administrations are to be repeated three times a day for three consecutive days.

"Its fruit is like that of the passionflower (*granadilla*). The flower is dark yellow, appearing in May. It is kept in bottles of alcohol for a week, one leaf and broken twigs. The leaves are tied on for pain. It is not used dry. After a few hours the effect is interrupted (*se arranca*). Although dangerous to drink, it can be sipped through the nose from the palm of the hand and rubbed onto the head for headaches and whistling ears. Kept in a well-sealed large bottle with a leaf and alcohol, the leaves are applied for three nights. *Misha curandera* changes into a snake (*víbora*)."

MISHA DEL INGA "OF THE INCA"

Brugmansia versicolor Lagerheim
Herbarium voucher DF/P/88/34

This is the only *misha* taken internally. One cup of the tincture is prescribed as a sedative and general analgesic at bedtime. It is claimed to have hallucinogenic properties; therefore, its effect has to be stopped in the morning by the "arranque." The whole plant or the shredded leaves are applied locally, in cases of muscular pains of traumatic or rheumatic origin.

"It's used for pains in the muscles and you go on a lot of diets after taking it: no cigarettes, no looking at fires, etc. You put a leaf in wine or otherwise a leaf with two flowers. The bottle must be transparent and you bury it for eight days. It's better to do it with the full moon. It's like *misha rastrera*. You make an offering of white sugar sprinkling it from a long way off by mouth and also a good perfume. If you concentrate, the *misha* reveals what you ask. You see colours: green, yellow and orange. It's like watching television. If you call someone by name he will appear (in the vision). You see if a person is good or bad. To find out if a person treats himself with herbs or medicine you can ask virtue (*virtud*: the powers or spirit of the plant). You drink it at night. Around six in the morning you grind a white rose in water, white maize powder and sugar, and you must not smoke or see fire."

DISCUSSION

Data collected on the ritual and therapeutic uses of *mishas* in Andean traditional medicine show the existence of a folk taxonomy of the genus *Brugmansia*. The people of this region

know the various species of *Brugmansia*, their morphology, and their physiological activities. In their folk systematics, the shamans associate the potency of each *misha* with names and virtues of animals (bear, lion, snake, hunting dog, bull) that best feature the myths of pre-Colombian cultures, and/or with therapeutic/magic properties (*rastrera*, from *rastreo* = to see things lost in space and in time; *curandera*, from *curo* = to treat ailments). It is important to note that, due to the strong toxic properties of *mishas*, their use is reserved only for *curandero*. Generally, the *mishas* are therapeutically used as topic anti-inflammatories and anti-rheumatics, but their major use is "to dream" (induce hallucinations). Moreover, the leaves of *Brugmansia* species are tied on the forehead "*para ver*" (to see). The obtention of altered states of consciousness is often obtained by topical application of the leaves of *mishas*; in recent literature it is possible to find such effects following transdermal applications of tropane alkaloids (Wilkinson 1987; Ziskind 1998). It is interesting to note that in the European Middle Ages, the witches used Solanaceae species, rubbing these plants on their broomsticks before climbing upon them, thus achieving in their peculiar way a sensation of flight.

The uses of *mishas*, both for psychotropic and therapeutic purposes, are undoubtedly due to the active principles of Brugmansias. In fact, the chemistry of this genus is primarily composed of active tropane alkaloids including scopolamine, atropine, aposcopolamine, hyosciamine, apoatropine, tropine, meteloidine, and over twenty others (Evans 1979). Tropane alkaloids are muscarinic antagonists that block neurotransmission across muscarinic cholinergic receptors. When administered internally in toxic doses, tropane alkaloids at first stimulate but eventually depress the central nervous system, giving rise to hallucinations, incoherent speech, delirium and convulsions, followed by stupor and coma. They paralyze muscles and secretory glands to the effect of stimulation of post-ganglionic, cholinergic nerve fibres. It is this action that causes dryness of throat and mouth. Atropine applied locally causes a slight paralysis of the sensor nerves, thus easing pain. This action probably relates to the frequent use of leaves in treating rheumatism (Brown and Taylor 2001). Solanaceae have been used as intoxicants since ancient times. Their alkaloids were the major ac-

tive components of the ointments of witches, of medieval anesthetic, and modern poison for murder. The hallucinations and illusions provoked could explain the use of these plants in fortune-telling and religious rituals (Muller 1998).

The use of *mishas* is strictly reserved for *curanderos*, due to their strong "hot" properties and the idea that *Brugmansias* are bad or dangerous. Only in particular cases do the *curandero* add *mishas* to the San Pedro decoction, in order to enhance its hallucinogenic effects. The vast majority of *mishas*, both those used for visionary purposes and those used for therapeutic purposes, traditionally involve a *dieta*. This consists in abstaining from certain foods as indicated in transcribed interviews. In the case of *mishas* used for divinatory purposes, the *dieta* includes abstaining from sex, even when it has not been explicitly mentioned.

The plants are administered in different solvents. For *mishas toro curandera*, *rastrera* and *del Inga*, the solvent is usually wine; *mishas galga*, *león* and *curandera* use cane alcohol; and for *mishas ocultadora*, *colambo*, and *oso*, water is prescribed.

It is worth pointing out that with some *mishas*—*toro curandera*, *rastrera*, *galga* and *ocultadora*—external use is prescribed for divinatory purposes and the leaves are tied to the forehead or nape of the neck. Except for *galga*, for which only external use is prescribed along with the San Pedro decoction, other *mishas* used for visions are applied both externally and swallowed. Three *mishas* (*toro curandera*, *rastrera*, *curandera*) are taken through the nostrils, a method also used for tobacco (Polia 1988).

An antidote, or *arranque*, is used to interrupt the effects of *mishas*. It is the same substance that is used to "cut" the effect of the San Pedro before sunrise, as it is believed that light is very harmful for anyone under the influence of psychotropic substances. In its richest version, the *arranque* is made up of powdered white maize, white sugar, lime juice, wild honey, petals of wild flowers (roses and carnations), and drops of *eau de cologne* and spring water. In addition to being drunk, the *arranque* is often sprinkled on the hands, solar plexus and nape of the neck. All of the ingredients used to prepare the *arranque* are of a "cold" kind, and thus serve to neutralise the "hot" or "very hot" properties of *mishas*. In fact, in the Andean folk medicine of

northern Peru, medicinal plants are divided into two groups: plants with "hot virtues" and plants with "cold virtues." Following this division, a distinction is also made between infirmities which are either "hot" or "cold." "Hot infirmities" are claimed to be cured by "cold" plants and a "cold" vegetarian diet, while "cold infirmities" are claimed to be cured by "hot" plants and foods. *Mishas* and other plants that produce hallucinations are unanimously classified as "hot" plants (De Feo 2003). This classification is supported by available literature. In fact, Bristol (1969) and Girault (1984) reported *Brugmansias* as hot species.

Comparing our data with previous available literature, some interesting observations are possible. The earliest description of a narcotic drink prepared with *Brugmansia sanguinea* in Peru was given by Tschudi (1846). The plant was called *huaca* and the drink was used to establish contact with the spirits of ancestors. *Huaca* stands for everything that had "power" and therefore manifests the presence of a spirit. In 1900, Humboldt and Bonpland reported the use of a narcotic drink known as *tonga* by priests in the Temple of the Sun of Sogamoza to the North of Bogota in Colombia (Lockwood 1979).

The folk and ritual uses of two *Brugmansia* species (*B. insignis* and *B. suaveolens*) have been documented in several zones of the Amazonian forest (Bianchi and Samorini 1993; Cabieses Molina 1990; Hunziker 1979; Lockwood 1979; McKenna, Luna and Towers 1986; Rivier and Lindgren 1972; Schultes 1979; Schultes and Hofmann 1973). The Jívaros of the Upper Amazon basin in Eastern Ecuador use *Brugmansia* in adolescent initiation rites. After a ritual washing in sacred waterfalls, the young Jívaros are sent off into the forest to observe periods of varying lengths of ritual solitude and fasting. During their isolation in the forest, the initiates imbibe an infusion of tobacco leaves to see a "spirit of the vision" (*arutam*), usually in animal form. If fasting and tobacco are not enough to establish contact with the *arutam*, a preparation of *B. suaveolens* macerated in water known as *maikua* is administered (Harner 1972). *Brugmansia*, mixed with maize beer (*chicha*) and tobacco leaves, was administered by Colombian Chibchas to drug slaves and wives before they were buried alive with their dead lords (Lockwood 1979). Amongst some of western Amazonian Indians of Ecuador, some *Brugmansia*

species (probably *B. candida* and *B. sanguinea*) are valued as a correctional measure for children (Schultes 1979).

In Andean zones, the ritual use of *B. sanguinea* and *B. aurea* was reported in the Sibundoy Valley, Colombia.

Schultes (1955, 1963a,b, 1970, 1972a,b,c,d, 1979) cited six species of *Brugmansia* diffused in the Andean highlands from Colombia to Chile, while only *B. suaveolens* is distributed in the warmer lowlands. The same author reported an extreme atrophied form of a tree-datura, called *Methysticodendron amesianum*. Vegetatively it is extraordinarily atrophied, reduced to the very narrowly ligulate, marginally irregular leaves. If it be an atrophied tree-datura, its flowers are so altered as to make it impossible to assign it to any known species.

Bristol (1966, 1969) recognized three species of *Brugmansia* (*B. candida*, *B. sanguinea*, *B. suaveolens*) and a number of cultivars of three species, used equally for medicinal and for psychotropic preparation by the Sibundoy Indians. The uses were related to their psychotropic, poisoning, and vermifuge activities (internally), and antirheumatic, suppurant in treatment of common cold (topically). The shamans (*kamsa*) use these psychotropic species to obtain a "vision" for divinatory-diagnostic purposes, but the same plant is also used for black magic. Significantly, the Colombian shamans consider the *Brugmansia* genus to be very "hot," similarly the Peruvian Andean shamans consider *mishas* to be *hot* (*calidas*) plants. In Sibundoy, *Brugmansia* use is not restricted to the shaman; few Indians, however, enjoy the hallucinations that are usually experienced. These are often described as visions of numerous large and poisonous snakes which the Sibundoy Indians fear.

Later, Lockwood (1973, 1976, 1979) reviewed previous literature, citing five species of *Brugmansia* and a number of hybrids and cultivars. This author emphasized that disturbed visions produced by *Datura* ingestion are interpreted as spirit visitations, enabling the shaman to diagnose disease, discover theories, and prophecy the future.

All *Brugmansias* used in the Andean zone appear to be cultigens and their ritual use has been documented in Mochica, Moche and Nazca ceramics (Cabieses Molina 1990). The plants show great variability in their morphology and cause some difficulties in their identification, due to

the fact that *Brugmansia* trees cross-breed very easily. On the other hand *curanderos* search for specimens with larger or stronger leaves (Bristol 1969; Friedberg 1963; Lockwood 1979; Schultes 1979). The rarer cultivars are owned by and cultivated in magical gardens of *curanderos*.

The idea that *Brugmansias* are bad or dangerous is still prevalent among many peoples in South America, due probably to its former widespread association with witchcraft and the belief that sleeping in the shade of *B. sanguinea* would induce insanity (Lockwood 1979).

Our data show that, still today, *Brugmansia* species represent a very important part of ritual-therapeutic practices in Northern Peruvian Andes, for both their medicinal and psychotropic properties. It is sometimes difficult to separate these two properties in a shamanistic religion where there is a characteristic emphasis on magic and the supernatural as causes of illnesses.

Solanaceous plants have played major roles in the development of many cultures and civilizations, particularly in the Americas. In primitive societies of the Americas, man has utilized many of the valuable properties of Solanaceous species. No aspect of their use, however, has more deeply fascinated the American Indians than their mind-altering activities (Schultes 1979).

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Hallucinogenic Plants of the Shuar and Related Indigenous Groups in Amazonian Ecuador and Peru

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Hallucinogenic plants of the Shuar and related indigenous groups in Amazonian Ecuador and Peru

BRADLEY C. BENNETT¹

Bennett, Bradley C. (Institute of Economic Botany, The New York Botanical Garden, Bronx, NY 10458-5126, U.S.A.). Hallucinogenic plants of the Shuar and related indigenous groups in Amazonian Ecuador and Peru. *Brittonia* 44: 483–493. 1992.—*Banisteriopsis caapi*, *Brugmansia suaveolens*, and *Nicotiana tabacum* are the principal hallucinogens used by the Shuar and related ethnic groups in Amazonian Ecuador and Peru. These three species are common hallucinogens throughout northwestern Amazonia. *Banisteriopsis caapi* (*natem*) is the hallucinogen most frequently employed by the Shuar. The Shuar drink the juice of *N. tabacum* during *natem* healing ceremonies. They also believe that smoke from *N. tabacum* cigarettes repel evil spirits. *Brugmansia suaveolens* is the strongest Shuar hallucinogen. Considered very dangerous, it sometimes is added to *natem* mixtures or it may be taken alone. Other plants used in hallucinogens or in narcotic beverages include *Brunfelsia grandiflora*, *Cyperus* spp., *Diplopterys cabrerana*, *Heliconia stricta*, *Herrania* spp., and *Ilex guayusa*.

Key words: Shuar hallucinogens, Amazonian Ecuador, *Banisteriopsis caapi*, *Brugmansia suaveolens*, *Nicotiana tabacum*.

Five related indigenous groups live in the eastern montane region of Ecuador and Peru: the Achuar or Achual, Huambisa, Aguaruna, Mayna, and Untsuri Shuar (Harner, 1972). Descola (1988) considered these Shuaran groups, with a combined population of 80,000, the most important indigenous nation in the Amazon Basin. The Untsuri Shuar, previously known as the Jívaro, reside in Ecuador; the Achuar in Ecuador and in Peru, where they are known as Achual; and the Huambisa and Aguaruna in Amazonian Peru. The Mayna probably are no longer extant, though the Candoshi and Shapra may be their living descendants (Brown, 1981). Seymour-Smith (1988) classified the Mayna as Shiwiari (Table I).

Shuar shamans (*uwishin*) drink hallucinogenic beverages to communicate with the spirit world, diagnose illnesses, determine guilt, and see the future. The Shuar believe

that witchcraft or sorcery causes most diseases (Harner, 1972). Bewitching shamans send magical darts (*tsentsaks*) that cause illness or death. Healing shamans can see and remove the harmful projectiles.

Shamans see spirit visions while under the influence of *natem* (*Banisteriopsis caapi* (Spruce ex Griseb.) Morton). According to several shamans, these spirits take the form of boas, frogs, tigers, dogs, and trees. Harner (1972) discussed other uses of hallucinogens by the Shuar. Parents give their new-born babies a mild hallucinogen to see a spirit vision (*arutam*). Young girls drink the same hallucinogen to contact *arutam*. Young boys drink juice from green *Nicotiana tabacum* L. leaves or juice from *Brugmansia suaveolens* (Humb. & Bonpl. ex Willd.) Bercht & Presl stems for the same purpose.

The use of hallucinogens is very circumscribed among the Shuar. They drink narcotic beverages only to communicate with the spirit world. The casual Western uses of hallucinogens for escape, relaxation, or experimentation are foreign to them.

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TABLE I
THE LOCATION OF THE UNTSURI SHUAR AND LINGUISTICALLY RELATED GROUPS.^a

Regional name ^b	Shuar Federation name ^c	Meaning	Location
Untsuri Shuar	Muráya Shuar	Montane Shuar	Ecuador
Achuar	Achua Shuar	Shuar of the achu palm region	Ecuador & Peru
Huambisa	Wampis Shuar or Tsumú Shuar	Lower river Shuar	Peru
Aguaruna	Awajún	Water people	Peru
Mayna	Shiwiar or Patukmai	—	Peru
Candoshi	Kantuash	—	Peru

^a From Seymour-Smith (1988).

^b Name used commonly in the literature.

^c Name proposed by the Shuar Federation.

In this paper, I discuss hallucinogens used by the Shuar and related Jívaroan groups in Peru and Ecuador. Several ethnological accounts discuss ritualistic drug use by Shuaran groups (e.g., Stirling, 1938; Harner, 1972; Brown, 1981; Descola, 1988), but none cite botanical vouchers. A comprehensive monograph on Shuar ethnobotany is in press (Bennett et al.). Descola (1988) mentioned plants used by Ecuadorian Achuar. Berlin (1976, 1977, 1978) published ethnobotanical data from the Aguaruna from Peru. Lewis published ethnobotanical accounts of other Jívaroan groups in Peru (Lewis & Elvin-Lewis, 1984; Lewis et al., 1987, 1988).

Methods and Materials

During an ethnobotanical study of the Shuar, Ecuadorian colleagues and I collected plants used to prepare hallucinogenic beverages (Fig. 1). We worked in 12 principal sites in Ecuador's Morona-Santiago Province (Bennett et al., in press). Most Shuar informants spoke Spanish and Shuar-Chicham. Young adults helped question the older, more knowledgeable informants who were mostly monolingual. Ethnobotanical vouchers are deposited in the National Herbarium in Quito (QCNE) and the herbarium of the New York Botanical Garden (NY).

I compiled data on other Jívaroan hallucinogens from Stirling (1938), Harner (1972), Brown (1981) and Descola (1988). These anthropological accounts contain excellent ethnographic data but none cite botanical vouchers. Nevertheless, most hallucinogens mentioned could be identified based on plant descriptions, methods of use, or linguistic data.

Results and Discussion

Principal hallucinogens.—As in many other western Amazonian groups, *Banisteriopsis caapi*, *Brugmansia suaveolens*, and *Nicotiana tabacum* are the principal hallucinogens of the Shuar. In Amazonian Ecuador, these species (or congeners) are used by the Quichua, Secoya-Siona, Cofan, Achuar, and Waorani. The Aguaruna and Shiwiar of Peru also use the same species (Table II). Ecuador's Waorani, a small isolated group, use *Banisteriopsis muricata* (Cav.) Cuatrec. instead of *B. caapi* (Davis & Yost, 1983). The Secoya-Siona use *Brugmansia* × *insignis* (Barb.Rodr.) Lockwood ex R.E. Schultes instead of *B. suaveolens* (Vickers & Plowman, 1984). Ethnobotanical descriptions of Shuar hallucinogens appear in Appendix I.

Banisteriopsis caapi (natem) is the most

FIGS. 1–3. 1. Efrain Freire and Patricia Gómez discussing plant names and uses with Pedro Kunkumas, a Shuar shaman, his wife María and his nephew Pedro. 2. *Banisteriopsis caapi* vine growing in secondary forest near the house of a shaman. 3. Young *Banisteriopsis caapi* vine planted at the base of a tree.



TABLE II
COMMON NAMES OF TAXA USED IN HALLUCINOGENIC BEVERAGES BY THE SHUAR AND RELATED GROUPS.

Taxon	Ethnic group				
	Shuar ^a	Shuar ^b	Achuar ^c	Aguaruna ^d	Shiwiar ^e
<i>Banisteriopsis caapi</i>	<i>natem</i>	<i>natem</i>	<i>natem</i>	<i>natem</i>	<i>natem</i>
	—	—	—	<i>datem</i>	—
<i>Brugmansia suaveolens</i>	<i>maikua</i>	<i>maikua</i>	<i>maikua</i>	<i>baikua</i>	<i>maikua</i>
	—	—	—	<i>bikut</i>	—
	—	—	—	<i>tsuak</i>	—
<i>Brunfelsia grandiflora</i>	<i>chinikiasip</i>	—	—	—	—
<i>Cyperus</i> spp.	<i>piripiri</i>	<i>piripiri</i>	<i>piripiri</i>	<i>karian</i>	—
	—	—	—	<i>pihiping</i>	—
<i>Diplopterys cabrerana</i>	<i>yaji</i>	<i>yaji</i>	<i>yaji</i>	<i>yaji</i>	—
<i>Heliconia</i> spp.	<i>winchu</i>	—	—	—	—
<i>Herrania</i> spp.	<i>kushiniap</i>	—	—	—	—
<i>Ilex guayusa</i>	<i>wais</i>	—	—	—	—
<i>Nicotiana tabacum</i>	<i>tsaank</i>	<i>tsaank</i>	<i>tsaank</i>	<i>tsang</i>	<i>tsaan</i>
<i>Peperomia</i> sp.	—	<i>tsentsem</i>	—	—	—
<i>Zingiber officinale</i>	—	<i>ajej</i>	<i>ajej</i>	<i>tunchi</i>	—
	—	—	—	<i>ajeng</i>	—
Malpighiaceae	<i>mukuyasku</i>	—	—	—	—
Indet. 1	—	<i>parapara</i>	<i>parapara</i>	—	—
Indet. 2	—	<i>tipuru</i>	—	—	—

^a Data from Bennett et al. (in press).

^b Data from Stirling (1938) and Harner (1972).

^c Data from Descola (1988).

^d Data from Brown (1981).

^e Data from Seymour-Smith (1988).

commonly employed Shuar hallucinogen (Figs. 2 & 3). Pedro Kunkumas, a Shuar shaman, prepares the *natem* beverage by first splitting a 1 to 2 m length of *B. caapi* stem into small fragments (Fig. 4). He places these in a pot with several liters of water and then adds leaves of *Diplopterys cabrerana* (Cuatrec.) B. Gates, *Herrania* sp., *Ilex guayusa* Loes., *Heliconia stricta* Huber and *mukuyasku* (an unidentified Malpighiaceae). He boils the mixture until most of the water evaporates and the solution has a syrupy consistency.

Natem ceremonies always are held at night for two reasons: 1) The alkaloids in *Banisteriopsis caapi* induce photosensitivity. Candlelight or even moonlight can irritate the shaman's eyes while under *natem*'s in-

fluence. 2) Healing shamans begin their work a few hours after dusk to counter the power of bewitching shamans who work at the same time.

In addition to drinking *Banisteriopsis caapi*, the Shuar drink alcohol and smoke tobacco (*tsaank*) cigarettes during *natem* ceremonies. Cigarette smoke helps protect the participants from evil spirits. Grain or sugar cane alcohol has replaced *chicha*, a traditional alcoholic drink made from fermented tubers of *Manihot esculenta* Crantz.

Only the shaman and his patient drink *natem*. Women and other male participants ordinarily do not consume the beverage. One person in the ceremony maintains a supply of cigarettes and matches and helps the shaman dispense the *natem* drink. The effects

FIGS. 4-7. 4. Pieces of *Banisteriopsis caapi* stem used to make the hallucinogenic *natem* beverage. 5. Pedro Kunkumas, a Shuar shaman, showing *Diplopterys cabrerana*, one admixture to *Banisteriopsis caapi*. 6. *Herrania* sp. leaves, shown here, are added to *Banisteriopsis caapi* mixtures by some shamans. 7. *Brugmansia suaveolens*, considered the most potent hallucinogen, is used less frequently than *Banisteriopsis caapi*.



of the hallucinogen begin 10 to 20 minutes after consumption, at first causing rapid breathing. The shaman often begins to sing or chant at the same time. Ceremonies last 3 to 6 hours or until the hallucinogen's effects diminish.

Schultes and Raffauf (1990) noted that at least 20 species may be added to preparations of *Banisteriopsis caapi*. Two are common: *Diplopterys cabrerana* (Fig. 5), used by the Shuar, Achuar, and Aguaruna, and *Psychotria viridis* Ruiz & Pavón. Both species contain N, N-dimethyltryptamine (DMT), the alkaloid most likely producing the hallucinogenic effects in *B. caapi* mixtures (Luna, 1986). *Banisteriopsis caapi* contains beta-carboline alkaloids (harmine, harmaline, and tetrahydroharmine), but the amounts in normal dosages are insufficient for hallucinogenic activity. Beta-carboline alkaloids, however, may inhibit monoamine oxidases, substances that render DMT inactive (McKenna et al., 1984; Luna, 1986).

No hallucinogenic principals have been reported from two of the additives: *Herzania* sp. (Fig. 6) and *Heliconia* sp. Another constituent, *Ilex guayusa* (Fig. 9), is a common stimulant in northwestern Amazonia. The Shuar often prepare a caffeine-rich beverage from this plant. Schultes (1972, 1979) gave more details on the Shuar's use of *I. guayusa*. The final additive, *mukuyasku*, is an unidentified Malpighiaceae.

Wilbert (1987) noted that Jívaroan consumption of tobacco (*tsaank*) includes chewing, drinking, snuffing, and smoking. He wrote, "... the Jívaro ... have institutionalized tobacco drinking to a degree unparalleled in South America." Wilbert's accounts are drawn from several anthropological treatises. Much has changed since they were written. Smoking seems to have replaced chewing and snuffing. Drinking tobacco juice, however, is still common. Young Shuar men consume juice from steeped tobacco leaves at the age of six to help them see *arutam* (Harner, 1972). Tobacco juice is the first hallucinogen taken by apprentice shamans. After becoming acclimated to tobacco, they drink the stronger hallucinogens *natem* and *maikua*.

Shuar shamans drink the juice from boiled

tobacco leaves during *natem* ceremonies. They sometimes add alcohol to the boiled tobacco leaves after drinking the liquid. The alcohol-tobacco mixture also is drunk and it is poured on *tumanks*, single-stringed bows, before they are used. Shamans play simple melodies on *tumanks* while under the influence of *tsaank* or *natem*.

The physiological effects of tobacco are biphasic. Small doses stimulate the central nervous system, depress hunger and thirst, and relieve pain. Large doses can produce catatonia, diarrhea, nausea, respiratory failure, visions, and trance (Lewis & Elvin-Lewis, 1977; Wilbert, 1987). Tobacco's physiological effects are due to nicotine, the predominant alkaloid, and to nornicotine.

The Shuar consider *maikua* (*Brugmansia suaveolens*) to be the most powerful and the most dangerous hallucinogen (Fig. 7). In describing its use, one Shuar informant said, "This is not a joke." The Shuar believe that repeated use of *maikua* leads to insanity (Harner, 1972). Though I commonly found *B. suaveolens* in Shuar communities, I never saw a shaman use *maikua* except as an admixture to *natem*. Harner (1972) reported that the Shuar drink raw juice from the green bark of *maikua* and described elaborate precautions used when taking this hallucinogen. *Brugmansia* contains several alkaloids including atropine, hyoscyamine, and the highly psychoactive hyoscine (Lockwood, 1979).

Minor hallucinogens.—Harner (1972) mentioned an unidentified, mild hallucinogen called *tsentsem*. Bennett et al. (in press) collected two *Peperomia* species call *tsem-tsem* (pronounced both as "tsentsem" and as "tsemtsem"). The Shuar we questioned used both as medicines but not as hallucinogens. Although there are no reports of the hallucinogenic use of *Peperomia*, some species contain alkaloids (Schultes & Raffauf, 1990).

One Shuar hallucinogen not reported from other Jívaroan groups is *Brunfelsia grandiflora* D. Don (Fig. 8). The Shuar name for this plant is *chinikiasip*, derived from the Quichua *chiricaspi*, meaning fever or cold tree. Informants reported that drinking an infusion made from the plant produces fevers or chills. The Secoya-Siona and Quijos



FIGS. 8-9. 8. *Brunfelsia grandiflora*, a Shuar hallucinogen probably adopted from the Quichua. 9. Dried *Ilex guayusa* leaves. These are added to *Banisteriopsis caapi* mixtures and also are employed as a stimulant or an emetic tea.

Quichua use the plant similarly as do other indigenous Amazonian people (Marles, 1988; Plowman, 1977; Vickers & Plowman, 1984). The chemical constituents of *Brunfelsia* are poorly known (Lewis & Elvin-Lewis, 1977; Plowman, 1977; Schultes & Raffauf, 1990).

Reports from the Shuar (Stirling, 1938), the Aguaruna (Brown, 1981), and Achuar (Descola, 1988) mentioned the use of *ajej* (*Zingiber officinale* Roscoe) as a hallucinogen, but this species has no known hallucinogenic principals. The Cariña apply a mixture of tobacco and *Z. officinale* to the eyes of apprentice shamans so that they can see spirits (Wilbert, 1987). Extracts from ginger have a depressant effect on the central nervous system (Schultes & Raffauf, 1990) and large doses may be hallucinogenic (Lewis & Elvin-Lewis, 1977). Although it is one of their most important medicinal plants (Bennett et al., in press), I found no hallucinogenic uses of ginger among the Shuar.

The Shuar, Achuar, and Aguaruna use several *Cyperus* species (*piripiri*) as hallucinogens (Table II). According to one Shuar informant, some shamans drink a tea made from the plant's roots for the same purpose as *natem* (see Appendix I). The chemical constituents of Cyperaceae are poorly known (Schultes & Raffauf, 1990). Species of *Cyperus* known as *piripiri* are used to induce childbirth, regulate menstruation, remove evil spirits, and treat other infirmities throughout northwestern Amazonia (e.g., Vickers & Plowman, 1984; Cipolletti, 1988).

Two hallucinogenic additives remain unidentified, *parapara* and *tipuru*. Harner (1972) and Descola (1988) mention the use of a plant called *parapara*. We collected an unidentified species of Violaceae with the similar name *parapra*. A name used by the Secoya-Siona for *Rinorea viridiflora* Rusby (Violaceae) is *ayahuasca*, the name used by the Quichua for *Banisteriopsis caapi* (Schultes & Raffauf, 1990). *Parapara*, perhaps, is a species of *Rinorea*. *Tipu* is a common name for *Croton* sp. in Peru (Soukup, 1970). Some *Croton* species produce morphine-like alkaloids (Schultes & Raffauf, 1990). *Tipuru*, therefore, may be a *Croton* species.

Comparison with other Jívaroan groups.— The Shuar, Achuar, and Shiwiar share the same names for their hallucinogens and most Aguaruna names are identical or linguistically similar (Table II). One name that differs is *tsuak* (meaning medicine), used by the Aguaruna for *Brugmansia suaveolens*. The many shared names of these species demonstrate the extent of inter-ethnic trade in Amazonia. This exchange continues today as shown by the Shuar use of the Quichua-derived name for *Brunfelsia grandiflora* (*chinikiasip*). The Shuar probably learned about the plant from the Canelos Quichua who live north of the Río Pastaza.

Some minor hallucinogens are used by a single ethnic group. Only the Shuar use *Brunfelsia grandiflora* (Bennett et al., in press). *Tipuru* and *tsentsem* (or *tsemtsem*) are mentioned only in Harner's (1972) monograph. If *tsentsem* is a species of *Peperomia*, it would represent the first hallucinogenic use of a species in this large genus. Its use by children is especially intriguing (Appendix I). The active chemical constituents of the principal Shuar hallucinogens are well known. The chemistry of the additives and minor hallucinogens awaits investigation.

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Appendix I

PLANTS USED IN SHUAR HALLUCINOGENIC BEVERAGES

Hallucinogenic plants are arranged alphabetically by family. Each treatment begins with the scientific name. The first paragraph lists the collection sites and provides a brief description of the plant. The second paragraph gives the Shuar or Spanish common names, followed within brackets by a translation (in quotes) of

the common name or when no direct translation is available, by the Latin name of the corresponding taxon. If the name is derived from a language other than Shuar, this language is listed preceding the translation. Translations of the roots of compound names within brackets are separated by a slash. For example, *aya-*

huasca has a direct translation in Quichua and appears as: [Quichua: *aya* "spirit"/*huasca* "vine"]. *Natem* has no literal translation, but the name corresponds to *B. caapi*, and it thus appears as: [*Banisteriopsis caapi*]. For each taxon, the translation of the folk generic root is given once, and subsequent entries are abbreviated. For example, since *piripiri* was previously translated as *Cyperus*, *uchi piripiri* is given as: ["small child"/*C.*]. The voucher specimens (collector and number) and initials of informants who provided the information about the specimen follows. Informants worked in groups. Their initials are arranged accordingly with a semicolon separating each group. Details on the study sites and informants appear in Bennett et al. (in press). The final paragraph begins with a classification of the hallucinogenic use (additive or hallucinogenic principal) and continues with a description of the use.

Aquifoliaceae

Ilex guayusa Loes.

Centros Pimpints and Yukutais. Tree of medium height, protected in agricultural fields or planted in house gardens.

wais [from Quichua: "*guayusa*" for *Ilex guayusa*]—Bennett 3659 (Informants: GS, DA & AA; MK & RN); *Kasent* 4 (Informant: PWK).

HALLUCINOGENIC ADDITIVE. The Shuar add *wais* leaves to *natem* mixtures. A tea made from the leaves is used as a stimulant and an emetic.

Cyperaceae

Cyperus spp. (including *C. articulatus* L., *C. odoratus* L. & *C. prolixus* Humb. & Kunth).

Centros Kankaim, Tiink, and Yukutais, and Misión Salesiano Bomboiza. Herb planted in house gardens.

piripiri [*Cyperus*]—Gómez 484 (Informant: MK).

piripiri de brujo [Shuar/Spanish: *C. / de brujo* "of the witch"]—Gómez 526 (Informant: MK).

intitash piripiri ["hair" / *C.*]—*Shiki* 170 (Informant: DS).

napi piripiri ["snake" / *C.*]—*Utittaj* 23 (Informant: AU).

uchi piripiri ["small child" / *C.*]—*Shiki* 316 (Informant: DS); *Utittaj* 21 (Informant: AU).

uchi achititai maikua ["small child" / unknown / *maikua* typically refers only to *Brugmansia* sp. but used here for *Cyperus*]—*Pujupet* 1013 (Informant: JP).

HALLUCINOGEN. The Shuar, Achuar, and Aguaruna employ *piripiri* in hallucinogenic beverages. A tea made from the roots is consumed by a shaman during curing ceremonies. After drinking the liquid, the shaman goes into a trance and is able to communicate with the deceased and ask them questions. For the Shuar, the spirit world is the real world. Illnesses may be caused by spirit possession, soul loss, or magical darts called *tsentsaks* that are sent by bewitching shamans. While in a hallucinogenic trance the shaman can see the cause of his patient's ailments. Medicines made from *piripiri* are used to treat headaches, colic, and snake bites and are used as galactagogues and tranquilizers.

Heliconiaceae

HELICONIA STRICTA Huber.

Centro Yukutais. Common herb to 2.5 m, in open areas.

winchu [*Heliconia* sp.]—Bennett 3578 (Informant: AA).

HALLUCINOGENIC ADDITIVE. The Shuar add *winchu* leaves to *natem* mixtures.

Malpighiaceae

BANISTERIOPSIS CAAPI (Spruce ex Griseb.) Morton.

Misión Salesiano Bomboiza; Centros Chiar Entsa and Pimpints. Woody vine found in primary-forests and cultivated in house gardens.

natem [*Banisteriopsis caapi*]—*Anananch* 160 (Informant: LA).

ayahuasca [Quichua: *aya* "spirit" / *huasca* "vine"]

HALLUCINOGEN. All Jívaroan groups use *B. caapi*. The stem is peeled, split, broken into small pieces, then placed in several liters of water. *Yaji* leaves (*Diplopterys cabrerana*) and *kushiniap* fruit husks (*Herrania* sp.) are added and then the mixture is boiled until most of the water has evaporated. The final product has a viscous, slightly syrupy consistency and may be stored for 2 to 3 weeks. The mixture is taken by the shaman after dusk so that he may communicate with the spirit world. One Shuar shaman prepares *natem* with leaves of *yaji*, *kushiniap*, *wais* (*Ilex guayusa*), *winchu* (*Heliconia* sp.), and *mukuyasku* (unidentified species of Malpighiaceae).

DIPLOPTERYS CABRERANA (Cuatrec.) B. Gates.

Misión Salesiano Bomboiza and Centro Nayanmak. Woody vine of primary-forest and house gardens.

yaji [hallucinogenic species of Malpighiaceae]—*Pujupet* 1048 (Informant: NOP).

HALLUCINOGENIC ADDITIVE. The leaves are added to *natem* mixtures, but they may contain the active principals responsible for the mixture's hallucinogenic effects (Luna, 1986).

Genus indet.

Centro Yukutais. Vine, cultivated in house gardens and in agricultural fields.

mukuyasku [unknown]—no collection (Informant: PK).

HALLUCINOGENIC ADDITIVE. The Shuar add the leaves to *natem* mixtures.

Piperaceae

PEPEROMIA sp.

Centros Kankaim and Yukutais. Epiphyte in montane forest.

tsemsem [unknown]—Bennett 3706 (Informant: AA).

HALLUCINOGEN. The Shuar give masticated *tsemsem* leaves to babies when they are a few days old. Older children are given the plant, which acts as a mild

hallucinogen. This helps them see their *arutam* soul (Harner, 1972). Harner's *tsentsem* may be *Peperomia*, but no voucher specimens were collected.

Sterculiaceae

HERRANIA sp.

Centros Tuutin Entsa and Yukutais. Small tree, 2.5 m tall of montane forest; protected in agricultural fields.

kushiniap [probably derived from *kushiskiam* for cacao]—*Anananch* 186 (Informant: LA); *Bennett* 3819 & 4055 (Informants: DA; JA & JCA; MK & PK).

HALLUCINOGENIC ADDITIVE. The Shuar add the inner bark, exocarp, or leaves to *natem* mixtures.

Solanaceae

BRUGMANSIA SUAVEOLENS (Humb. & Bonpl. ex Willd.) Bercht. & Presl.

Misión Salesiano Bomboiza; Centros Kankaim, Pampants, Pimpints, Tiink, and Tuutin Entsa. Shrub to 2 m, cultivated in house gardens.

maikua [*Brugmansia* sp.]—*Bennett* 3312 (Informant: JCA); *Kunkumas* 131 (Informant: PK); *Warush* 32 (Informant: AW).

tsuakrutin maikua ["medicine" / *B.*]—*Shiki* 317 (Informant: DS).

tuktur maikua [derived from the Spanish word "doctor" / *B.*]—*Kasent* 36 (Informant: WK).

uchi tukutai maikua ["small child" / unknown / *B.*]—*Shiki* 284 (Informant: DS).

ukunch maikua ["bone" / *B.*]—*Utitiáj* 7 (Informant: AU).

waimiatai maikua ["to have a beneficial encounter" / *B.*]—*Pujupet* 1028 (Informant: JP).

yawa maikua ["dog" / *B.*]—*Kasent* 43 (Informant: WK); *Shiki* 333 (Informant: DS).

HALLUCINOGEN. All Jívaroan groups use *B. suaveolens*. It is considered very dangerous. Juice from the stems is taken to "become brave". The Shuar take *waimiatai maikua* to see the future (Broseghini & Frucci, 1986). Hallucinations caused by this plant last up to 3 days. This allows the recipient to find his *arutam* or ancient specter soul (Harner, 1972). Children who misbehave are given *maikua* (Harner, 1972). While in a hallucinogenic trance, the children see the truth of their parents' ways and may also contact their *arutam* soul. Medicines made from the plant are used to treat menstrual pain, prevent weakness, and guard against infections.

BRUNFELSIA GRANDIFLORA D. Don

Centros Chiar Entsa, Kankaim, Tuutin Entsa and Yukutais. Cultivated shrub, 3 m tall.

chinkiasip [derived from Quichua: *chiri* "fever" / *caspi* "tree"]—*Gómez* 400 (Informant: AA); *Shiki* 349 (Informant: DS).

HALLUCINOGEN. The Shuar make a hallucinogenic beverage from an infusion of stems and leaves. Shamans "receive strong feelings" and they can easily cure infirmities after taking a tea made from the plant.

NICOTIANA TABACUM L.

Centros Pampants, Pimpints and Yukutais. Cultivated in house gardens. Native to tropical America.

tsaank ["tobacco"]—*Bennett* 3596 (Informant: MK).

HALLUCINOGEN. All Jívaroan groups cultivate *N. tabacum* for its stimulant and hallucinogenic properties. The smoke is used to treat victims who have seen bad visions of the devil. Shuar shamans drink green tobacco juice during *natem* ceremonies (Bennett et al., in press). Tobacco is also used to "clean" young girls when they begin to menstruate. A puberty rite for girls involves drinking juice of green tobacco leaves. This enables them to communicate with the spirit world which will help them in raising crops and animals. Boys also consume *tsaank* and *maikua* during puberty rites. The plants are believed to help the young men to find an *arutam* soul (Harner, 1972). Apprentice shamans are initiated with green tobacco juice before they take stronger hallucinogens. The leaves are applied externally to treat headaches.

Violaceae

Genus indet. (possibly *Rinorea* sp.).

Centro Tuutin Entsa. Primary-forest shrub, 1 m tall. *parapra* [unknown]—*Anananch* 151 (Informant: LA).

HALLUCINOGEN. Some Shuaran groups use an unidentified species called *parapra* as a hallucinogen. This may be the same species as *Anananch* 151.

Zingiberaceae

ZINGIBER OFFICINALE Roscoe.

Centros Pampants, Pimpints, Tiink, and Yukutais. Common, rhizomatous garden herb. Native to tropical, southeastern Asia.

ajej ["ginger"]—*Gómez* 483, 503 (Informant: MK).

kaur ajej ["rotten" or "diarrhea" / g.]—*Kasent* 11 (Informant: WK); *Utitiáj* 3 (Informant: AU).

napi ajej ["snake" / g.]—*Kasent* 9 (Informant: WK); *Warush* 25 (Informant: AW).

penke ajej ["real" or "genuine" / g.]—*Warush* 22 (Informant: AW).

seeka ajej [unknown / g.]—*Utitiáj* 25 (Informant: AU). *jenjibre* [Spanish: "ginger"]—*Gómez* 483 & 503 (Informant: MN).

HALLUCINOGEN. The Shuar, Achuar, and Aguaruna use *ajej* as a hallucinogen. Broseghini and Frucci (1986) reported that shamans take *ajej* to gain power.



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Notes on the Use of Plant Hallucinogens in Amazonian Brazil

GILLEAN T. PRANCE¹

Amazonian Indian use of hallucinogens has been known for a long time (Spruce 12), but the plants used have only recently become the subject of close attention. Schultes et al. (6, 7, 9, 10, 11) have summarized the present knowledge of the plants used, and since these publications other workers have added further information.

My experience in Brazil (most recently in 1968–9) has been primarily as a taxonomist making systematic collections of herbarium specimens. While engaged in field work in various areas of the Amazon region, I encountered utilization of two known hallucinogens in two new localities and was able to make notes about their use and collect botanical specimens of the source plants.

Some of this account will duplicate what has already been written (e.g., Schultes et al. 5, 6, 7, 9, 10). It may also be somewhat limited, because I was engaged in taxonomic field work rather than ethnobotanical research. I hope, nevertheless, that these notes will stimulate other field workers to add to ethnobotanical knowledge by observing primitive uses of plants, recording details, and collecting material adequate to identify the plants accurately.

Sanama Indian snuff at Auaris, Roraima Territory

The details of the use of hallucinatory snuff in the northwest Amazon has been summarized by Schultes et al. (9, 11).

The observations are based on the use of a hallucinatory snuff by the Sanama Indians (part of the Waikás as defined in Schultes, 9) at Auaris in the extreme northwest corner of Roraima Territory in Brazil. This snuff is prepared from a single species, *Virola theiodora* (Spruce ex Benth.) Warb., which I have identified from two collec-

tions pointed out by Indians from the two different tribes at Auaris (the Sanamas and the Mayongongs). The material is as follows: *Prance et al.* 9638, sterile; *Prance et al.* 9684, flowering.

It is interesting that the Waiká Indians at Tototobí, described by Schultes et al. (9), likewise employ the *Virola* alone. Many other groups using narcotic snuffs add material from a wide variety of unrelated plants. Schultes (11) has pointed out that the resin of *Virola* is rich in hallucinatory tryptamines and that it contains approximately 8% 5-methoxy N, N-dimethyltryptamine, N, N-dimethyltryptamine. The tryptamines are presumably also the active ingredients in the snuff at Auaris.

The Indians select a tree of *Virola* in the forest, strip the bark off in large sections, and then build a fire at the same spot. They heat the bark sections over the fire so that the resin oozes out. The resin is scraped off with arrowheads and left on the same arrowheads, which are then placed in a container made from a bamboo stem. These are later scraped in the maloca, and the powder which is scraped off forms the snuff. They occasionally fill a small gourd with resin, but their main method of storage appears to be on the arrowheads.

The arrowheads have a dual purpose. They are employed for poisoned arrows in hunting and as a storage for the snuff. These two uses are recorded by Schultes (9) for Indians at Tototobí, although the arrows are not the prime method of storage at Tototobí.

As far as could be ascertained, the snuff is utilized in two ways by the tribe: to enable the witch doctor to go into a trance before treating a patient; and at ceremonies following the death of a member of the tribe. They do not appear to take the snuff, except on these two occasions, and no casual uses of the snuff were observed. I did not see the witch doctor take the snuff and hence cannot describe that use.

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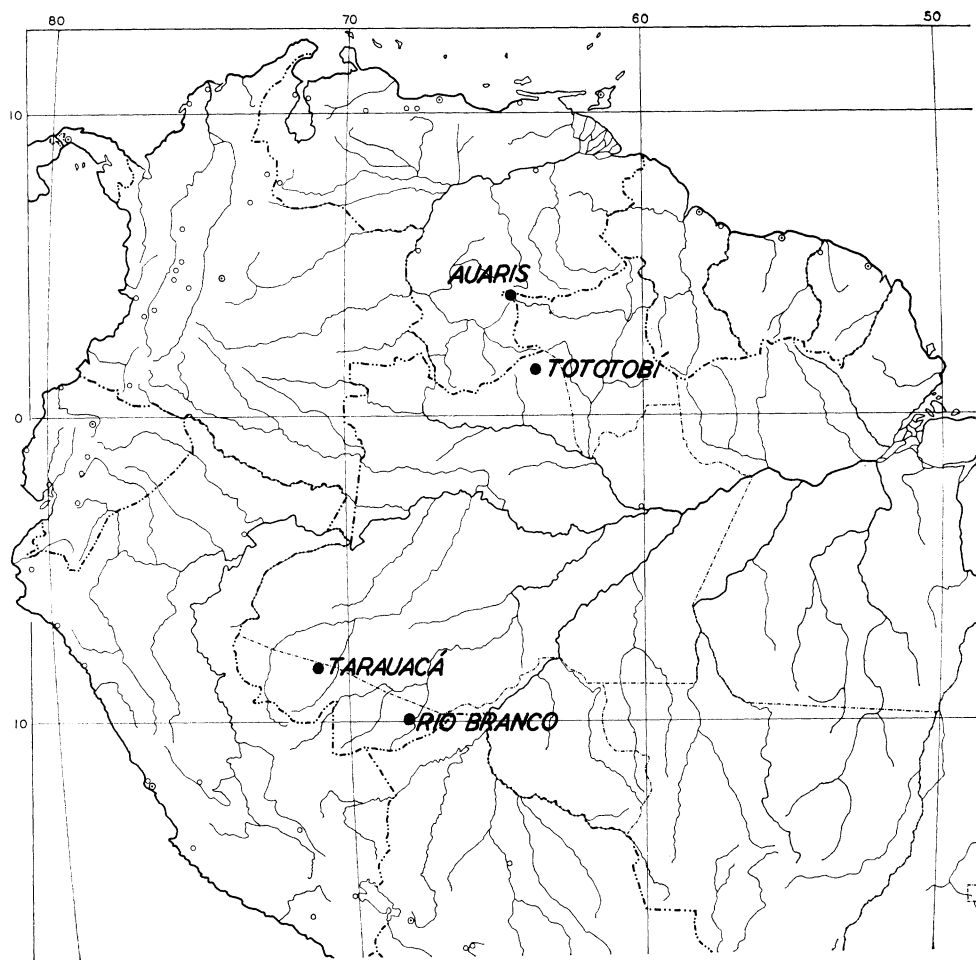


FIG. 1. Map showing localities described in text.

I was, however, able to make notes at a ceremony for the dead after a member of the tribe had died from what appeared to be a common cold to which the Indians have little or no resistance. They have at least one of the ceremonies described below for each person who dies, including infants; in some cases, they have more than one.

The ceremonies following a death are long and complicated and last about eight days. This description concentrates on the employment of the *Virola* snuff. The ceremony begins when most of the men from the tribe go hunting for big game (tapir, pigs, spider monkeys, and capybaras). A hunt lasts about 12 days. While the hunt

is taking place, one man goes out to invite a group from another village. The visiting group arrives before the hunters return and spend most of their time drinking a highly fermented beverage made from *Manihot*. The hunters return to join the drinking, and the intensity of the following ceremonies depends on the success of the hunt.

The women make large quantities of beijú, a large "pancake" made from tapioca flour. The meat is smoked, boiled, then tied up in large portions to be consumed during the ceremonies.

The Indians dance every night for five to ten days (it was eight days when we were there). On one night, the men and

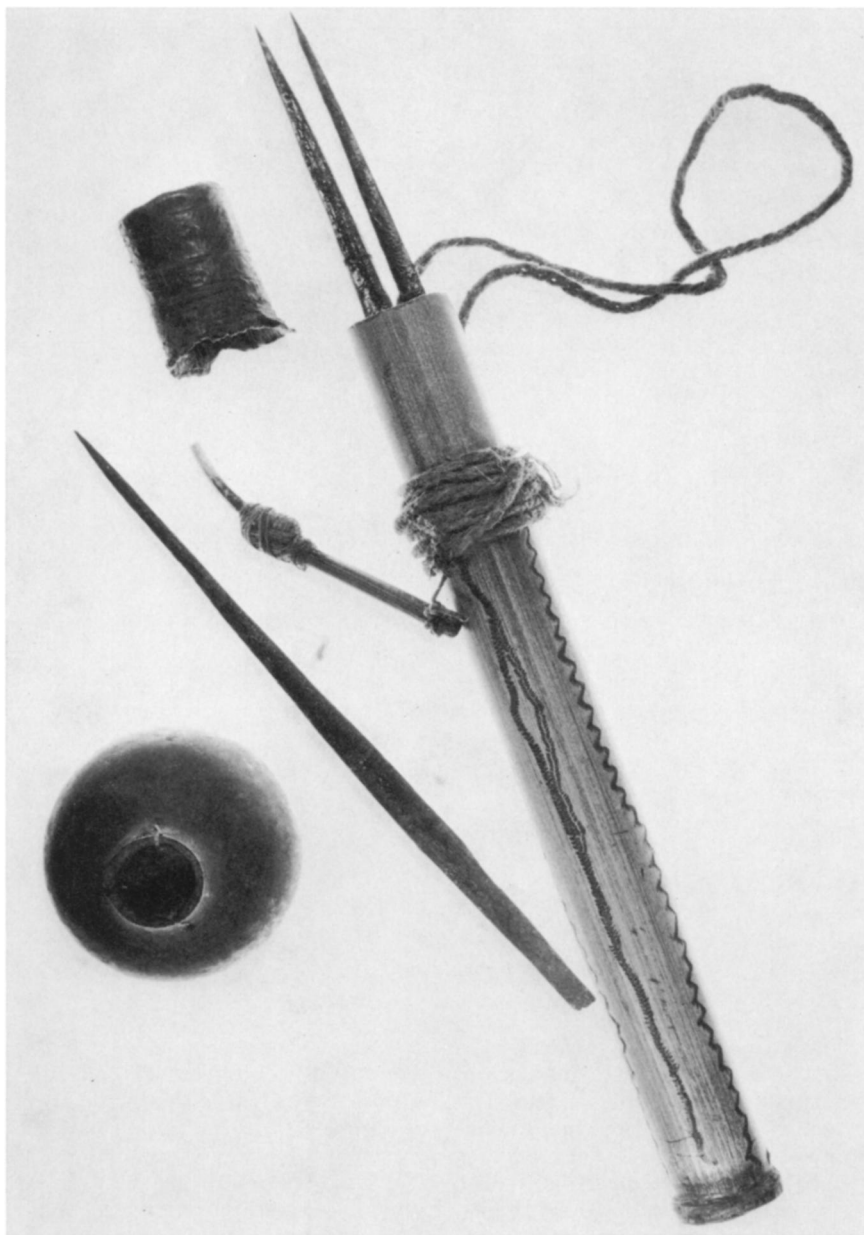


FIG. 2. The storage of *Virola* resin: showing a gourd full of resin, a bamboo arrow point container and its deer-skin lid, arrow points coated with *Virola* resin, and a scraping knife made from the tooth of an agouti.

often the boys dance; on another the women dance, dressed in palm leaf skirts.

The snuff is used one night during the ceremonies. First of all two or three older

men gather in the middle of the maloca and start scraping powder off the arrowheads coated with *Virola* resin. One man then sniffs the powder first; then everybody



FIG. 3. Indians at Auaris taking part in one of the ceremonial dances with their weapons following the death of a member of the tribe. These dances are preparatory to the snuff-taking ceremonies described.

starts sniffing. The snuff is administered in two ways: by taking a pinch and sniffing it, or by having someone blow it into the nostrils with a small blowpipe.

The whole group then gathers in the center of the maloca and starts dancing, holding weapons (bows, arrows, or axes) over their heads and shouting. An informant told me that they also commune with the spirits, while under the influence of the narcotic. This is followed by an incredible chest-hitting ceremony. If any one has a grievance or is upset, he takes it out on somebody else in the group by chest-hitting. This takes place usually in pairs, but it may also be done in small groups. One man offers his chest as a target to another man who hits as hard as he can with his fist, a rock, or a piece of pointed metal. After one hit, the process is reversed and the other man does the hitting.

This continues, the blows alternating, until one of the pair has had enough and capitulates. The hitting is hard, and blood often runs, but the man who is hit usually does not appear to flinch, apparently anaesthetized by the narcotic. Next, they all squat down, put their arms around each others neck, and shout into each others ears. All in the house choose a partner and enter the shouting ceremony, which becomes quite deafening. When they reach a peak of sweat and excitement, the bone ashes of the deceased are poured on the fire in the maloca. The shouting gradually dies down as the effect of the drug diminishes.

Uascá in Tarauacá, Acre State

Long before I first visited the town of Tarauacá in the state of Acre, Brazil, I had heard about the hallucinatory bev-

erage which is drunk there. Tarauacá has quite a reputation in Amazonia for its use of the drink. When I visited Tarauacá in September, 1968, I made enquiries about the source of the hallucinogen and was able to obtain collections of the plants involved from two separate sources and to obtain a quart of the beverage.

Unlike the snuff described above, the Tarauacá drink is not used nowadays primarily by the Indians but by the local Brazilian population. The beverage was obviously of Indian (perhaps Cachinahua) origin. It is still taken by the Indians who inhabit the upper region of the Rio Tarauacá. One of my collections was from the Indians, while the other was from the Brazilians in Tarauacá. The Indian population on the Rio Tarauacá is small, and the village which I visited was acculturated. These observations were made on the local Brazilian population of Tarauacá.

Many of the inhabitants of the village, when questioned, admitted to having experimented with the beverage at least once, and some families use it regularly. In Tarauacá, the population all refer to the beverage as cipó (the Portuguese word for "liana"). None of the people in Tarauacá used the more widely known name uascá (or ayahuasca in Peru). Perhaps this is because of the secretiveness shown by all who use the drink.

The use of the beverage has spread from Tarauacá through Acre to the state capital of Rio Branco where it is always referred to as uascá. In Rio Branco, there are several highly secret groups that meet to drink the narcotic in much the same way as described below for Tarauacá.

It is interesting that the Brazilian users of hallucinogens, as contrasted to the Indians, have adapted the indigenous tribal use of a narcotic for their own purposes, but have attached their own folklore to its use and made their own ceremony rather than using the Indian one. Cipó has become a part of the Acre culture. The ceremony described below is quite different from the Indian ritual.

There are two ingredients of cipó or uascá in Tarauacá: one a shrub, the other a vine. The shrub is a *Psychotria*, *P.*

viridis R. & P.², the vine a member of the malpighiaceae genus *Banisteriopsis*.³ It is obviously this liana which gives the beverage the name cipó in Tarauacá. The use of the latter as a hallucinogen has long been known. It was first reported in 1852 by Spruce (12), and discussed in detail by Schultes (5). The use of *Psychotria* as an ingredient of native hallucinogens was reported for the first time as recently as 1967 by Schultes (8). It is particularly interesting that the combination of these two plant genera in narcotic beverages has been discovered in the last two years in three geographically widely separated localities: amongst the Kofán Indians of Amazonian Ecuador by Pinkley (4); the Cachinahua Indians of Amazonian Peru (3); and now by the Indians and Brazilians in the vicinity of Tarauacá, Brazil.

The *Psychotria* is a common species in the forests near Tarauacá and was easy to find. It is interesting that the local people distinguished the correct species from other rather similar rubiaceous shrubs by the presence of domatia at the base of the primary leaf veins. The *Banisteriopsis* is much harder to find, because its supply has been severely depleted by use. One has to go a long way into the forest to find the vine growing naturally. It is cultivated by a few people in Tarauacá for a more easily obtainable supply. The vine is easy to propagate; and, when a small section of the root is planted, it sprouts and grows quickly.

Banisteriopsis contains the hallucinatory compounds harmine and harmaline (1, 2, 11), and *Psychotria psychotriaefolia*, the admixture for *Banisteriopsis* drink in Ecuador, has been found to contain N, N-dimethyltryptamines (3). It is, therefore, to be expected that *Psychotria viridis* may likewise contain this tryptamine.

The natives at Tarauacá were very insistent that both plants are needed for the beverage to have the desired effect. Some people told me that they had used the

² *Psychotria viridis* R. & P.—Prance et al. 7534, fruiting. *Psychotria* sp. probably *viridis* —Prance et al. 7302, sterile.

³ *Banisteriopsis* sp. cf. *inebrians* Morton—Prance et al. 7498, sterile.

drink without the *Psychotria* leaves and in consequence had had a vastly inferior hallucination experience.

The *Banisteriopsis* vine is cut into sections and put into a saucepan of water which is allowed to heat up almost to a boil. The leaves of *Psychotria* are added and allowed to simmer for another half hour. The liquid is left to cool and is bottled and corked. The liquid obtained is rust-brown with much plant residue remaining in it. It has an acrid taste. According to the users, the beverage remains effective and is stored for up to four weeks.

On my second day in Tarauacá, I was able to visit a large family who use the beverage frequently, apparently without harm or addiction. There were several children in the house who also admitted to drinking the beverage. The family reported that they merely take cipó in connection with spirit worship, a cult that is extremely common and growing in the region. The use of uascá in Rio Branco is also largely connected with the spirit-worshipping sects.

Apart from the use in spirit-worship, individuals in Tarauacá and other towns in the region frequently gather to drink the beverage. The group begins by taking a large quantity of the drink except for one man, the *mestre* (or master) who is in charge and who does not drink on that occasion. They then shut their eyes and wait for the hallucinogen to take effect, while background music is played. During this time, a few of them vomit up the drink.

The hallucinations then begin. The job of the *mestre* is to bring anyone out of his hallucination experience when it appears to be a bad one. He does this either by touching him, which usually works, or by putting a strong smell under his nostrils. The smell was produced by ammonia, or apparently in some cases by a leaf of an unidentified plant, which I was unable to obtain during my visit. When the *mestre* has brought a person out of his hallucination, the intoxicated individual needs only to close his eyes again to resume his hallucinations. They continue under the supervision of the *mestre*, until the effect of the

hallucinogen wears off. During the entire process, loud music usually is playing in the room.

Those who have taken the beverage referred to having seen particularly bright colors and large sized objects and animals, particularly snakes and jaguars. Some people reported seeing cities which they had never visited and described ocean liners and large stores, etc., in considerable detail. I met an air force captain who had once taken movies to show at Tarauacá to the Indians up river. He said that the Indians were distinctly disappointed by the movies (one a cowboy film, and the other a documentary about Brazil). They told him that they had seen all that and even more while under the influence of cipó, and they said that in the future they would use cipó instead.

Acknowledgments

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Ethnobotanical Notes from Amazonian Brazil

GHILLEAN T. PRANCE¹

Introduction

During the course of a year of field work in Amazonian Brazil in 1971, I visited four different tribes of Indians in widely separated localities (Fig. 1). While among these tribes, we were able to gather much ethnobotanical information, some of which is presented here. Many of the plants discussed have already been reported in other sources cited, but some of the plant uses given here are recorded for the first time. The principal aim of this study, however, is to provide well documented evidence of these plant uses correlated with herbarium voucher material. The collections cited are deposited in the herbaria of the New York Botanical Garden (NY), the Instituto Nacional de Pesquisas da Amazônia (INPA), and the Economic Herbarium of the Botanical Museum of Harvard University (ECON).

Three of the four tribes visited now live on the fringes of western civilization and show a varying degree of acculturation. Therefore, it is extremely urgent to gather as much ethnobotanical information as possible before it is permanently lost. We made a special effort to collect data from the Indians on their uses of plants.

A. The Jamamadis

The Jamamadi village which we visited is situated about 120 km South of Lábrea on the Rio Apitua, about four hours walk from the Rio Purus at Seringal Jurucuá. This group has retained much of its own culture, while living

close to Brazilians and working for Brazilians. It is remarkably little acculturated for a group that works in rubber exploitation, gathering and selling rubber and Brazil nuts. In addition to the snuff and arrow poison described here, the Jamamadis were able to show us many plants that they use for medicines, buildings, canoes, thatching, etc. They work with ceramics, which are hardened by the bark ash of *Caripé* (*Licania octandra* Hoffm. & S.) Kuntze; hunt with blow guns made from a species of *Iryanthera* (Myristicaceae); and play flutes made from hollowed-out wood. However, as they also own shot guns and even a record player, it is probable that they will soon lose much of their own culture.

1. Shinã, a narcotic snuff

Ingredients:

Nicotiana tabacum L. (Prance et al. 13928).

Theobroma subincanum Mart. (Prance et al. 13933, 13939),

"Cowadimani"

This snuff is prepared from tobacco and the bark ash of various species of *Cacau*. The tobacco leaves, heated on top of a convex metal bowl, are rolled with a wooden rolling-pin to squeeze out all the juices (Fig. 2). It takes about 20 minutes to dry the leaves crisp by this process. At the same time, a fire is made from the bark of the *Cacau* (*Theobroma*). When the leaves are crisp and dry, they are broken up into a wooden bowl and ground into a fine powder with a wooden pestle (Fig. 3). At the same time, ash from the *Cacau* bark is added in roughly equal quantities. The snuff is then ready for use. The group definitely prefers fresh snuff and appears to make it most evenings. Most members of the tribe carry a small

¹ B. A. Krukoff Curator of Amazonian Botany, the New York Botanical Garden. Submitted for publication May 25, 1972.



FIG. 1. Map of tribal localities described in text.

amount of the snuff with them in an assortment of containers.

The snuff is administered by sucking it into the nostrils through a small pipe made from a hollow monkey leg bone (Fig. 4). One person will hold out the snuff on a leaf, while the other takes it, drawing it in turn into each nostril (Fig. 5). Almost all of the tribe, including children, carried the bone pipes.

The snuff has an intoxicating effect on the users, who appear inebriated and talk of light-headedness. This snuff is certainly a powerful intoxicant, but it is not hallucinogenic. No one speaks of hallucinations in connection with it. The Jamamadis appear to take it from early childhood, since we observed a four year old taking it regularly, and a

ten year old girl traded her supply of snuff and her pipe with us.

The Indians are insistent that the snuff is ineffective without the *Theobroma* bark ash and said that they never take a pure tobacco snuff. The use of this tobacco-cacau snuff covers a rather large area of Amazonia between the Rios Purus and Juruá. A similar snuff was found amongst the Deni Indians on the Rio Cunhuá (see below under the Denis).

2. Irã, an arrow poison

Ingredients:

Strychnos solimoesana Krukoff (Prance et al. 13929), "Ira".

Curarea toxicofera (Wedd.) Barneby & Krukoff (Prance et al. 13931), "Bicava".



FIG. 2. Jamamadi woman prepares tobacco leaves for the narcotic snuff "Shinã." The leaves are placed on an inverted metal bowl and the juices rolled out with a stick.

Guatteria cf. *megalophylla* Diels (Prance et al. 13936), "Boa".

Fagara sp. (Rutaseae) (Prance et al. 13937), "Balala".

The Jamamadis have a *Strychnos*-based curare which is used to poison their blow gun darts and which is extremely effective. It paralyzed a chicken rapidly. The poison is prepared from a mixture of the stem bark of all four of the species given above, with the *Strychnos* and *Curarea* being used in greater quantities than the other two plants, and more *Strychnos* than *Curarea*. The bark mixture is heated, boiled and concentrated into a sticky residue which is then used to coat the darts. The blow gun itself is not hollowed out whole as in the other tribes which I have visited, but it is split into two, hollowed out and

bound together with the inner bark of an annonaceous species with a readily peeling inner bark and stuck with resin. The blow gun is made from young trees of the myristicaceous species *Iryanthera tricornis* Ducke (Prance et al. 13938).

The species of *Strychnos* used, *S. solimoesana*, was first reported as the principal ingredient of a curare in Krukoff (5), where it is cited as the main constituent of the Cauichana Indian arrow poison. That tribe lives on the Rio Tonantins far from the Jamamadi territory. *S. solimoesana* was studied chemically by Berredo-Carneiro (3, 4), who isolated the two alkaloids stricnoletaline and curaletaline from the stem bark; and by Marini-Bettolo and associates (9), who detected the presence of 40



FIG. 3. Jamamadi man grinds the "Shinā" snuff ingredients in a wooden mortar and pestle.

alkaloids in the stem bark. The latter authors list all of these alkaloids, 14 of which were new. *S. solimoesana*-based poison is said to be one of the most powerful and effective paralyzing curares.

As the name of the menispermaceous ingredient would suggest, it is a well

known component of curare. Its use in the curare of several tribes is discussed in Krukoff and Barneby (6) under *Chondrodendron toxicoferum*; see also Barneby and Krukoff (2). As far as I know, *Guatteria megalophylla* has not been previously reported as an ingredient of arrow poison. However, it is



FIG. 4. A Jamamadi child taking a sniff of "Shinã" through a bone pipe.

not a surprising constituent, since a species of the closely related genus *Unonopsis*, *U. veneficiorum* (Mart.) R. E. Fries, has long been known as an arrow poison ingredient of the Tecuna arrow poison; and two species of *Duguetia* are reported as ingredients of the

Java Indian poison in Krukoff and Smith (7).

B. The Denís

The Dení village which we visited is situated on the upper Rio Cunhuá

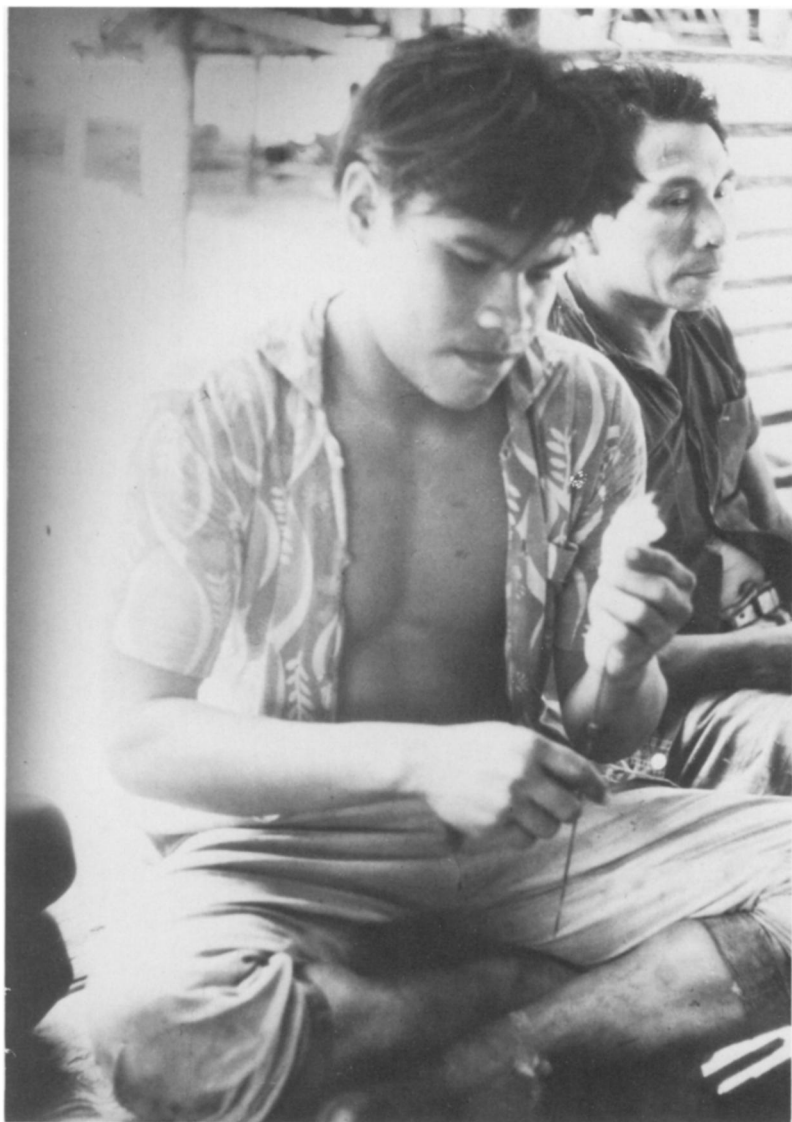


FIG. 5. A Jamamadi man preparing the cotton flight of a blow gun dart poisoned with the curare described in the text.

(marked as Rio Tapauá on most maps) at about $6^{\circ}20'S$; $67^{\circ}40'W$ (see Fig. 1). This group inhabits the region from west of the village visited up to the Rio Juruá and has only recently come into regular contact with Brazilians. The

group of the tribe which we observed is the most westernised, as it lives nearer to Brazilians and is adopting much Brazilian culture, upon which it is heavily dependent for food supply. At this stage, however, they retain

much of their own culture, especially in respect to plant uses.

1. Tsinã, a snuff

Ingredients:

Nicotiana tabacum L.

Theobroma subincanum Mart. (Prance et al. 16515), "Mapanahã".

The Denís have the same snuff as the Jamamadis. It even has the same name, although their languages are very different. The group of Denís which we visited use the snuff less than the Jamamadis.

2. Baduhu-tsinã, a snuff

Ingredient:

Pyrenocarpous lichen (Prance et al. 16503).

The Denís have a second snuff called Baduhu (=deer) — tsinã (=snuff). This is collected from a pyrenocarpous lichen. Unfortunately, due to the stage of development of the lichen when collected and when used as a snuff, further identification is impossible, according to Dr. Mason Hale. The yellow powder of the medulla on the surface of the lichen is collected from the tree trunks where it grows. This powder is then sniffed in small quantities. It does not appear to have a narcotic effect but rather to cause extreme irritation and a tingling sensation in the mucous membranes of the nose. When we sniffed it, we were all seized by a violent attack of sneezing, much to the amusement of everyone present. This snuff is taken rather frequently by the Denís and causes sneezing.

3. Bekú, a contraceptive

Ingredient:

Curarea tecunaru Krukoff & Barneby (Prance et al. 16453)

A missionary couple, Paul and Dorothy Moran, who work among the Denís, have observed the regular spacing of children in a family. They further note that the tribe had a definite cycle

for conception in which only one woman in the group is pregnant at any given time. The Morans started to inquire within the tribe about their apparent birth control and deduced that it was linked to a common menispermaceous liana which is taken in the form of a drink following childbirth.

The Denís collect the main stem of the liana and pound it with a hard wood or stone to open it up (Fig. 6). The beaten vine is placed in a pan of water to extract the sap (Fig. 7). This is filtered through a cloth and is then drunk. The liquid is taken usually a few weeks after a birth. It is drunk in large quantities by both the males and the females. They drink about a gallon of the preparation, until it induces vomiting. It is then vomited and followed by a smaller dose which is retained. According to the Indians, a single dose of Bekú is effective for a long time: up to two years. From observations in the tribe, it seems possible that the active ingredient affects the males rather than the females, as the only two women to be pregnant at the same time were the wives of the same man.

It is interesting that this plant, which is drunk in large quantities by the Dení Indians, belongs to the genus *Curarea* and represents a species which is well known as an ingredient of arrow poisons [See Barneby & Krukoff (2), and Krukoff & Barneby (6)]. In the latter work, it is cited as the arrow poison of the Kofán Indians in Colombia (page 41, under the old name *Chondrodendron iquitatum*). Krukoff & Barneby (6 p. 38), under *C. limacifolium*, also give chemical details of three alkaloids found in this species by Barltrop & Jeffreys (1). The latter authors state: "the extracts were very toxic but did not produce paralysis."

We have made large collections of the stem of this vine and await the re-



FIG. 6. A Deni woman beating the vine of *Curarea*, "Bekú", which is used as a contraceptive.

sult of chemical analyses to see what chemical constituents, besides those mentioned above, are present.

C. The Makús

The Makú group which we visited live on the Upper Rio Uneiuxi. The Rio Uneiuxi is a tributary of the Rio Negro, which joins it at Ilha Grande. Like the Jamamadis, this Makú group is to some extent acculturated and works for a Brazilian gathering *Sôrva* latex (*Couma* sp.) and other products. However, they still live in communal dwellings and retain much of their plant culture. The Makús have an especially large number of medicinal plants and fish poisons.

1. Botô, the Makú coca.

Ingredients:

Erythroxylum coca L. (Prance et al. 15572),
"Ipadu"

Banana leaf ash

The coca plant is cultivated in large quantities in the Makú fields, since it is used daily to mix with their food. Other reports on the use of coca by the lowland Amazon tribes [e.g. Schultes (14)] describe the preparation of coca leaves by pulverization as given below, but the method of use is generally different from that of the Makús. Coca is more often taken into the mouth and slowly worked with the tongue into a packed mass between the cheek and the gums. This mass is dissolved slowly rather than eaten with food, as in the case of the Makús.



FIG. 7. A Deni woman soaking the beaten "Bekú" vine in water to extract the juices which are drunk as a contraceptive.

Coca leaf is harvested by the Makús and placed in a large flat pan to toast, until it is crisp and dry (Fig. 8). At the same time, a fire is made, and green banana leaves are burned. The dried leaves are placed in a wooden bowl, ground into a powder and mixed with the banana leaf ash. There is a ceremony attached to the pulverising, and a rhythm is often beaten out with the wooden grinding stick while other Indians chant. The extremely deep, long, hollow pestle which they use (Fig. 9) makes a loud drum-like noise when the wooden pestle is knocked against the side. The different rhythms which they beat tell the rest of the Indians how the preparation is progressing. When the ashes and leaves are ground into a fine powder, they are ready for use. The

powder is mixed with cassava, either with farinha flour or tapioca flour. This powder from coca forms a part of the daily diet of the Makús, and they prepare it fresh every evening. The powder itself is not unpleasant to taste, tasting only of dried leaves, and did not have any adverse effect on those members of our expedition who sampled it. Since the active ingredient of the coca plant is cocaine, the powder taken by the Makús obviously results in deadening hunger pains. The ash is added to the coca leaves to activate the narcotic by providing an alkaline environment, as do the coca-quids of the highland Indians. This use of *Boto*, as the Makús call it, is common. We observed it also amongst a second Makú group living at



FIG. 8. A Makú preparing the leaves of the Coca plant. The leaves are roasted dry in the metal box before being ground and mixed with ash.

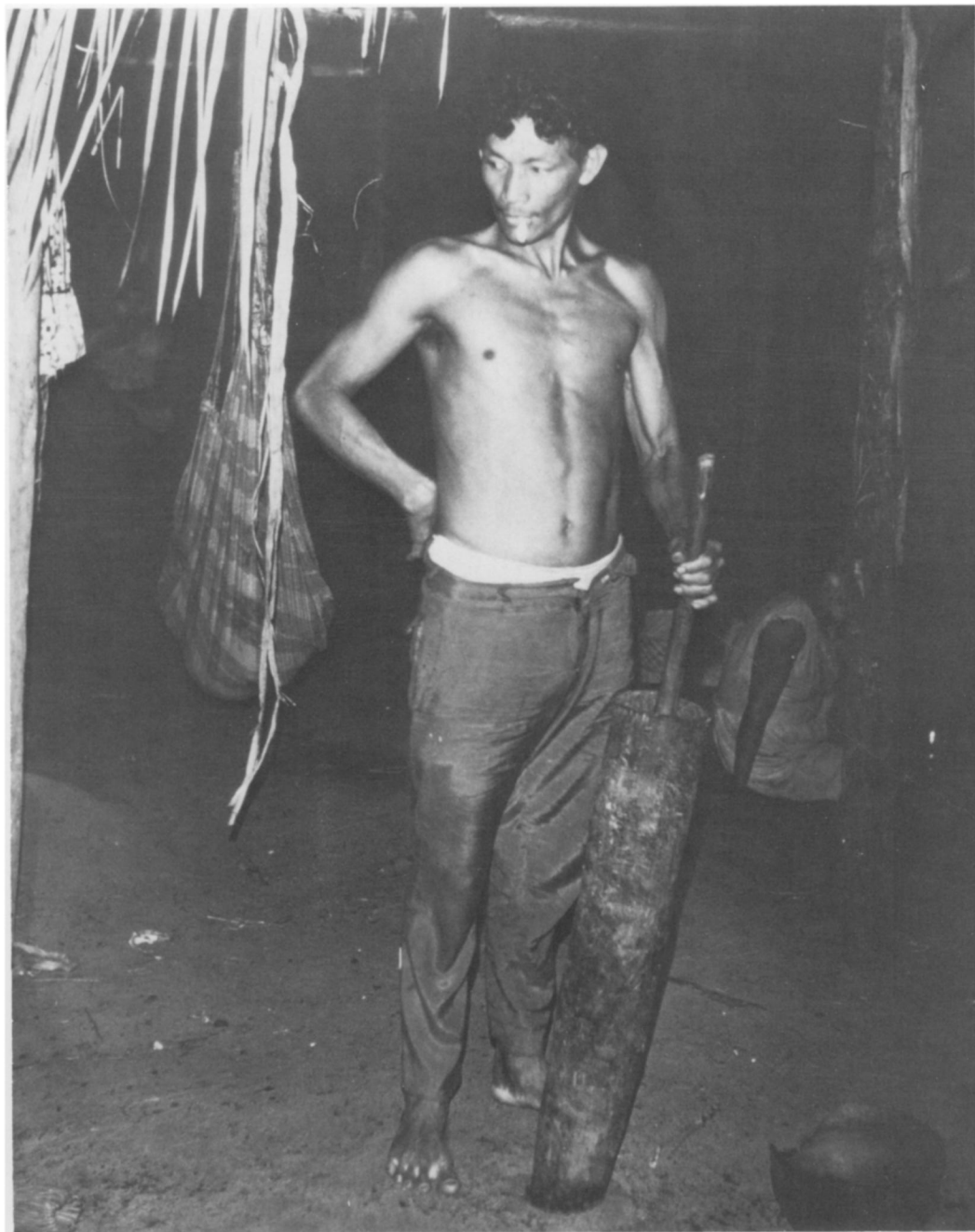


FIG. 9. A Makú grinding Coca leaves mixed with banana ash. The tall deep mortar acts as a sort of drum to beat out a rhythm while he prepares the powder which is mixed with food to deaden hunger pains.

the mouth of the Rio Curicuriarí much further up the Rio Negro.

2. Arrow poison

Ingredient:

Naucleopsis mello-barretoii (Standl.) C. C. Berg (*Prance et al.* 15563).

The Makús use blow guns with the darts poisoned by the latex of this species of the Moraceae. The latex is collected into a folded leaf and coated directly onto the darts in the forest (Fig. 10). *Naucleopsis* has previously been reported as an arrow poison in Colombia. Presumably, the active ingredients are cardiac glycosides, as this genus is known to contain them in large quantities in the latex. The glycosides of the

Moraceae are presently being studied by Dr. N. G. Bissett of the Chelsea College Department of Pharmacy in London. He has also received a sample of my Makú collection.

3. Warapash, a poison

Ingredient:

Carpotroche amazonica Mart. (*Prance et al.* 15584).

Warapash, which is used as a bait to poison armadillos, is an interesting poison. The bark is scraped off the *Warapash* tree and heaped at the mouth of armadillo burrow. The armadillos eat the poison and die nearby. The purpose of this use of poison is to kill the armadillos for eating.



FIG. 10. The Makú method of extracting arrow poison from the latex of *Naucleopsis mello-barretoii* (Standl.) C. C. Berg.

4. Caramã, a poison

Ingredient:

Ryania speciosa Vahl var. *minor* Monachino
(Prance et al. 15587).

Another poison is made from the same plant family as the *Warapash*, the Flacourtiaceae. This poison was employed by old people for suicide until rather recently, a type of euthanasia acceptable in this tribe. The poison was also utilized to kill enemies, but these uses have now stopped. The stem-bark, mixed with food, provides a quick-acting poison.

The Makú use of *Ryania speciosa* as a poison is not surprising. It is a well known toxic plant containing the alkaloid ryanodine, much used as an insecticide. Ryanodine was first reported

from *R. speciosa* by Rogers et al. (12), and a summary of the uses and of the publications about ryanodine is given by Monachino (10).

5. Fish poisons

Much has already been recorded about the various fish poisons used in Amazonia (e.g. Krukoff & Smith, 8), so their use is not described in detail here. All four of the tribes discussed here cultivate species of *Clibadium* (Compositae) and *Lonchocarpus* (Leguminosae) as fish poisons. Since the Makús have a large number of different fish poisons, they are listed here. The tribe seems to make frequent use of the fish poisoning (Fig. 11), and they often go through the forest a long way to a suit-



FIG. 11. A Makú fishing party. The men are beating the leaves of the poisonous plant, *Euphorbia cotinifolia* L. The juices drop from the rack into the river below and poison fish for 1 km downstream.

able stream for a fishing party which may last days or even weeks. During this time, an enormous quantity of fish is caught and eaten. The following is a list of the poisons actually observed in use by us in the Makú village:

Carawá — *Euphorbia cotinifolia* L (Prance et al. 15554) — branches and leaves

Cantibnā — *Phyllanthus brasiliensis* (Aubl.) Poir. (Prance et al. 15556) — leaves

Canabed — *Clibadium sylvestre* (Aubl.) Baill. (Prance et al. 15555) — leaves & fruit

Doouí — *Lonchocarpus urucu* Killip & Smith (Prance et al. 15573) — stem & leaves

Pûrsh — *Caryocar glabrum* (Aubl.) Pers. (Prance et al. 15576) — fruit mesocarp

D. The Waikás — Hallucinogenic snuffs

1. *Viola* based

Ingredients:

Viola theiodora (Spruce ex Benth.) Warb. (Prance et al. 10685).

Justicia pectoralis Jacq. (Prance et al. 10531).

In 1971, much time was spent with the Waikás,² since we walked one of their trails from Surucucús to the Rio Uraricoeira in the northwest of Roraima Territory. The trail passes through six Waiká villages. The two months amongst the Waikás gave me further opportunity to study their hallucinogenic snuff made from *Viola* bark which I have already reported (11) and which has been discussed by several other workers, especially Schultes (13, 18).

² This is their popular name; technically they are known as the Yanomam Indians.



FIG. 12. Waiká Indians take part in a shouting ritual following a dose of their hallucinogenic snuff.

The *Virola* based snuff is used in all six villages which we visited. It is taken in a similar way to that described in Prance (11), see Fig. 12. When the earlier paper was written, I had only observed snuff made from pure *Virola theiodora*. During 1971, we passed more time with these Indians and found that in two of the six villages they commonly add the dried leaves of *Justicia pectoralis*.

The collections were studied chemically in Sweden by Dr. Bo Holmstedt, and only the *Virola* was found to have an active hallucinogenic ingredient. The *Justicia* is apparently added to the snuff for aromatic purposes rather than as an active ingredient (letter from Dr. Holmstedt). The snuff has a more pleasing aroma with the *Justicia*.

The same *Virola* snuff was collected also at another Waiká village (the Ninams) over 150 km away from the Suru-

cucus trail at Posto Mucajaí on the Rio Mucajaí. That group always use the *Justicia*. The herbarium vouchers for the Ninam collections are:

Virola theiodora (Prance et al. 10984).

Justicia pectoralis Jacq. (Prance et al. 11174).

2. Piptadenia based

Ingredient:

Piptadenia peregrina (L.) Benth. (Prance et al. 15425).

Hallucinogenic snuffs are extremely important in the life of the Waikás, since, wherever the group are, they appear to have a snuff. While travelling on the upper Rio Negro, I came across a group of Waikás from the Rio Marauíá returning from a trip to collect *Piptadenia* fruit for their hallucinogenic snuff. This snuff, made from the roasted seeds of *Piptadenia peregrina* (Fig. 13),



FIG. 13. Extracting the seeds from "Paricá", *Piptadenia peregrina* (L.) Benth. for use in the Waiká hallucinogenic snuff described in the text.

is well known, and a review of the historical confusion over this species is given in Schultes (13); further information is given in Schultes (15, 16), where it is stated that the major alkaloid is bufotenin. The *Piptadenia* snuff is a particularly strong intoxicant, having a much more powerful effect than *Virola* snuff. It is of interest that the *Piptadenia* does not grow in the actual home area of the Marauíá Waikás, who make an annual trip to collect their supply of *Piptadenia* seeds from near the mouth of the Rio Uneiuxi, where it grows abundantly in open pastures (Fig. 14). It was at this locality that we were able to collect the *Piptadenia*.

Acknowledgments

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FIG. 14. A Grove of "Paricá" trees near the mouth of the Rio Uneiuxi. The Waiká Indians make a long canoe journey to here each year to collect the seeds for use in their hallucinogenic snuff.

Mr. & Mrs. Paul Moran and the Captain and crew of the INPA motor launch Marupiara for the Denis, to Mr. Joseph Boot for the Makús, and to Mr. Fritz Harter, the Unevangelized Fields Mission Roraima Section, and the Missionary Aviation Fellowship and especially their pilot Lyn Entz for the Waikás. I should like to thank the various specialists who have rapidly identified the collections cited here, Dr. M. K. Arroyo (Leguminosae), Mr. R. Barneby (Menispermaceae), Dr. C. C. Berg (Moraceae), Dr. J. Cuatrecasas (Theobroma), Dr. B. A. Krukoff (Menispermaceae, Strychnos), Dr. W. Punt (Euphorbiaceae), Dr. W. Rodrigues (Myristicaceae), Dr. H. Sleumer (Flacourtiaceae), and Dr. D. Wasshausen (Acanthaceae).

I am grateful to Drs. B. A. Krukoff and Richard E. Schultes for their continual encouragement with the ethnobotanical aspects of my Amazonian field program.

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The Use of Hallucinogenic Mushrooms for Diagnostic Purposes among some Highland Chinantecs

ARTHUR J. RUBEL AND JEAN GETTELFINGER-KREJCI¹

*This article describes the ingestion of hallucinogenic mushrooms—*Psilocybe Hoogshagenii* Heim—as a means to diagnose illness among contemporary Chinantec-speaking Indians of the Sierra de Ixtlán, Oaxaca, México. It is possible that several varieties of hallucinogenic mushrooms are used amongst these highland Chinantecs, the specific variety utilized depending upon “seasonal availability and the precise purpose for which the narcotic is to be taken” (Schultes, 1972: 10). However, the following describes only the observed use of *Psilocybe Hoogshagenii*, and it should not be generalized to the use of other mushrooms which may prove equally available to diagnosticians in the Sierra.*

As Wasson, Schultes, and Heim have already made abundantly clear, the contemporary usage of narcotic mushrooms in México boasts a long and venerable past. It is now clear that at least some of the hallucinogenic mushrooms utilized in contemporary México were represented by the *teonanacatl* of the pre-hispanic and colonial past. It is unfortunate that, for the most part, those descriptions of *teonanacatl* usage which do come down to us from the early chroniclers, describe its use amongst Nahuatl speakers of the central highlands, leaving only speculation as to the extent to which those descriptions might be applied to non-Nahuatl speakers, located in the more southern regions of México.

However that may be, it is a reasonable assumption that the Spanish missionaries forcefully inveighed against and fearsomely sanctioned continuance of the use of hallucinogenic mushrooms or such other mood modifiers as morning glory seeds or fermented liquors. The confessional used by

Padre Nicolás de León (La Barre, 1959) is a case in point, as is the *Doctrina Christiana en Lengua Chinanteca* used by Padre Nicolás de la Barreda. Padre de León's concerns are illustrated in the following translation into English (La Barre: 23):

Art thou a sooth-sayer? Dost thou foretell events by reading omens, interpreting dreams, or by tracing circles and figures on water? Dost thou suck the blood of others? Dost thou wander about at night, calling upon dreams to help thee? Hast thou drunk peyotl, or given it to others to drink, in order to discover secrets, or to discover where stolen or lost articles were?

Of more immediate interest are the concerns of F. de la Barreda during the early 18th Century, inasmuch as de la Barreda's parish included Santiago Comaltepec, the *municipio* from which this current information derives. Comaltepec, San Juan Yólox, and, probably, San Juan Quiotepec are three localities which were joined together by a civil *congregación* in 1603 to form a single parish served by a priest who resided in the town of Yólox. Incidentally, these three *municipios* are the exclusive components of the sub-group of Chinantecs known as Dza-Hmi (Weitlaner and Cline:

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1; Cline's introduction to de la Barreda: 19). Father de la Barreda's major concern for his parishioners is reflected in some questions from his confessional of 1730, which refer to the First Commandment:

Have you adored, given cult to the devil, or to poles (palos), or to the Sun, as your ancestors did? Have you become a witch or sorcerer? Do you have herbs or other instruments in the house with which you are able to communicate with the devil? Do you have herbs or other instruments in the mountains with which you can communicate with the devil? [39, 41]

It is curious that he makes no specific mention of either hallucinogenic mushrooms or *Rivea corymbosa*, although it is a reasonable possibility that implicit reference was made to these substances when questions were asked of the confessor with respect to divination, the use of special plants, herbs, "or other measures for the exercise of witchcraft and sorcery" (Cline: 61 Weitlaner and Cline: 551). As Cline noted with respect to de la Barreda's 18th Century confessional, "In spite of the brevity of the questions and the absence of many details, it is clear enough that in 1730 as well as today, a great part of the ancient rituals and beliefs persisted in Yólox. The plain, unadorned suggestions found in de la Barreda serve only to excite the researcher's appetite without satisfying it."

The paucity of ethnographic references and inferences to be drawn from de la Barreda, and the rarity of materials left us by other chroniclers of the Sierra de Ixtlán prior to the Twentieth Century (Weitlaner & Cline: 530; Gwaltney: 198-205) make it difficult to ascertain the importance of *pulque*, *Rivea corymbosa*, or *Psilocybe Hoogshagenii* during the centuries preceding our own. Today, however, it is very clear that residents of Santiago Comaltepec regularly ferment and drink both *pulque* and *tepache* during the seasons when they are available (and without any indication of public, uncontrolled inebriation about which Father de la Barreda expressed so much concern), but neither the mushrooms or *Rivea corymbosa* are used extensively today except by a very few people. We have record of only a handful of men and

women in the entire municipio of more than 1,100 residents who have ingested mushrooms. When they have done so it is only to diagnose, or divine the whereabouts of a lost object or animal, or to establish communication with deceased loved ones. To our knowledge, there is no one in Comaltepec regularly using *Rivea corymbosa*, although residents are aware that it is available in the neighboring municipios of San Juan Quiotepec and San Miguel Maninaltepec in which localities there are persons who take it in the form of a tea to divine on request (cf. Mac Dougall). It should also be noted that although the senior author is well acquainted with several very reputable healers in Comaltepec, none of them to my knowledge make use of either *Rivea corymbosa* or *Psilocybe Hoogshagenii* for purposes of diagnosis, healing or divination. The only person of our acquaintance to regularly use *Psilocybe Hoogshagenii* in Comaltepec is Don Antonio from whom most of the following ethnographic information derives.² Don Antonio ingests mushrooms only on the request of patients seeking diagnosis or the whereabouts of lost articles or animals. Compared to other healers, Don Antonio does not boast of high stature in this community.

Don Antonio is a Chinantec-speaking male of approximately 36-40 years of age. He was born in the municipio and attended several grades of elementary school, but is functionally unable to communicate in Spanish. Like other healers of the municipio, Don Antonio learned his techniques during an apprenticeship with another, elder practitioner whom he paid for the training received (cf., Munn: 103, 105, 119).

Several meetings with Don Antonio permitted the collection of information about beliefs related to the collection and use of the hallucinogenic mushrooms preliminary to observations of a night-long session during which he ingested ten of the plants.

These transcriptions of conversations and, later, observation of a session indicate how very much interwoven are the moral-

² The name Don Antonio is a pseudonym to provide the medium some protection from outsiders.

istic norms which help govern this peasant society and a deferential involvement with those supernatural beings—"the children"—who so readily reinforce those moralistic norms. Despite the infusion of moralistic admonitions in the talk of "the children", and despite the deference with which they are treated, one is hard-put to describe the observed ingestion of mushrooms as either a ritual or a religious mystery in this municipio. This, of course, is in remarkable contrast to the ritualism and sense of mystery associated with the collection, preparation, and ingestion of hallucinogenic mushrooms among the nearby Mazatec of Huautla de Jiménez as described by Wasson (1972: 195) and Munn, or among other Mexican groups described in the literature. However, this relative paucity of ritual or mystery in Comaltepec is quite consonant with the more general observation that such symbolic elaboration is quite scarce throughout the cultural life of this municipio.

Among the more important beliefs governing the use of hallucinogenic mushrooms in Comaltepec, are the following. For best effect, the mushrooms should be eaten only on the favorable or propitious days of Wednesday, Saturday, and Sunday. The plants may be picked by anyone, male or female, married or unmarried, child or adult. They may be collected at any time of the day, but may be eaten only at night and in a secluded spot isolated from the sounds of other humans. The mushrooms are not processed in any way after picking. They are not ground, nor are they to be soaked or boiled in water. Neither should they be cut with a knife. Because the mushrooms are of a "cold" quality the medium needs sip on *mezcal* liquor throughout the session. (For concepts of "cold" and "hot" in this region, see Adams and Rubel). There is no need to practice sexual continence prior to eating the mushrooms, but one must abstain from the eating of a heavy meal immediately before a session. On the other hand, it is quite alright to eat lightly of soft boiled eggs, coffee, chocolate, bread, although tortillas are considered too heavy. As a matter of fact, the distilled liquor *mezcal* and "holy water"—*agua bendita*—

are prescribed accompaniments of eating the hallucinogenic mushrooms in this community, and coffee is considered a necessity. The *mezcal* and coffee provide the medium the strength necessary for the rigors of the experience, and *mezcal* counteracts the "very cold" quality inherent in the mushrooms.

On the other hand, the holy water is kept alongside the medium before and after he eats the hallucinogens in order to protect him from undesirable effects. "The people are also accustomed to drink holy water when they have a bad trip with the mushrooms. You can die, or you can find your mouth tight, so much so that you cannot talk. That is why you require holy water at hand." The most common cause of a bad trip, according to Don Antonio, is the lack of good faith on the part of the client. That is, if the person asking Don Antonio for assistance is either trying to ridicule the latter's diagnostic procedures or really does not believe in the worthiness of "children" (*Los Niños* or *Los Chamaquitos*). Characteristic of a bad trip is that, instead of pretty little children arriving to the sounds of lovely music, such ugly animals as snakes, octopus, tigers, and coyotes march before one's eyes, encircle his face and head, often-times kissing him on the lips and eyes. Don Antonio reports that sipping holy water before lying down, but after eating the mushrooms, serves to prevent such horrendous experiences.

From the reports of Don Antonio, complemented by those of a few others who have accompanied mediums as they partook of the mushrooms, a good trip is a most pleasant and rich experience. If one has eaten only "female" mushrooms there will appear to him only female children, if one has eaten only "boys," then only boys will appear. There is some controversy over the relative value of "boy" and "girl" mushrooms (*machos* and *hembras*) because Don Antonio, on the one hand, avers that "the boys are more powerful and talk more," whereas a woman who has eaten the mushrooms reports that this is not so. Nevertheless, there seems agreement that it is best to take boys and girls together so that boys and girls together will appear to the diag-

nostician. It should be emphasized that Comaltepec informants universally denied the requirement of eating mushrooms in pairs: a boy and a girl, a boy and a girl, together.

Informants also agree that the boys and girls are approximately one inch in stature or approximately the height of a full-grown *Psilocybe Hoogshagenii*. According to Don Antonio: "The *chamaquitos* look and dress the way that people look here. They wear cotton trousers (*calzones de manta*), they are little boys and girls. (It should be noted that the *calzones de manta* are the traditional indigeneous costume for highland males, but only three or four men in the entire *municipio* were observed to dress so conservatively, and no children were observed in *calzones de manta* during Rubel's year in the community.)

"They are just a very little taller than the mushrooms, and they look like the mushrooms. They seem to be very handsome. They wear stocking-hats (a woolen hat very much affected by the male residents of the highland, cold regions). On the other hand, they are barefoot and wear neither sandals or shoes. Some of them are dark-skinned, others light, just as are the mushrooms, themselves, of different colors. Sometimes they speak Spanish, sometimes they speak in Chinantec. Even when they speak amongst themselves, they speak both languages mixed together. They appear to be poor people as I am for, after all, it is I who am eating the mushrooms."

As has been mentioned earlier, Don Antonio's reports of his involvement with the respected children are very much enfolded within moralistic reinforcement to the norms of behavior in the community. The children speak in support of cooperative and friendly interpersonal relations. They enjoin against fractious and hostile ties. In support of such an orientation, they oppose the fractiousness generated by witchcraft accusations, enjoin against the breaking of promises, or the ridiculing of others. When a client requests assistance in good faith and treats the medium with respect, and the diagnostician has not eaten a large meal immediately prior to eating the mushrooms, then the boys and girls enter in a

good humor. "They enter by twos and threes, boys and girls together. They enter dancing, and leaping, and playing. When they come in a good humor, there is very pretty music, it is very pretty. But only when they are in a good mood.

"There are those in our community who want to know the truth. They ask me to find out which person is doing them harm. They want the names of those people, that is the custom of our people. But, I have not been able to tell them the names of their enemies because the mushrooms, themselves, do not permit it. The boys and girls who appear before me say 'No'. They will not seek out the names, they won't give me the names! They will only say that the patient should ask God—*Dios*—for help, or that the patient should make a vow to God. That is all that they permit. They *do* tell me that someone is doing harm to the patient, but they refuse to identify who it is. If they were to do so, it would cause me difficulty, and cause my patient difficulties. That is why they do not wish to identify the person causing my patient's illness.

"The mushrooms advise me that the reason why they will not tell me the identity of the witches (*dañadores*) is to protect me, that is what they advise me. At times, the people would become drunk and they would strike me because I have identified them, and then I would suffer.

"There are many kinds of sickness, but many times the people don't carry out the cures that I advise. They only desire to ask me their questions in order to ridicule me, as shown by the fact that they do not comply with my recommendations. That is why I do not like to agree to eat the mushrooms for the people because I lose time and, besides, I suffer (from a consequent bad trip). There are those who ask me what they should do and I find out for them, I make recommendations to them, but they do not follow my instructions. Instead, they blame a witch (*brujo*) for the persistence of their condition. I get tired of those who do not obey what I recommend to them. It is tiresome. For example, there is the case of a woman who once came to ask me questions. I told her what she must do, I told her that she was suffering from *susto* [for

description of the *susto* illness, see Rubel, 1964]. I gave her the cure which the mushrooms had given to me for her. She never complied [with my advice]. Then she returned to ask me to eat the mushrooms a second time for her. I took them again, but this time the mushrooms scolded me [*me regañaron*]. They said to me: 'Why do you do whatever the people ask you to? If the people don't do what you tell them to, if they only make fun of you, then you should not comply with their whimsies'. The mushrooms recommend that the people make a vow, or request a mass for the dead, or they recommend remedies which the patient should take, and they counsel that the patients have faith in God. That is what the mushrooms say!"

In this vein, the mushrooms also admonish Don Antonio to look out for his own welfare as well as that of his clients. "The mushrooms tell me: 'You comply with what we have advised, and if the others do not, the fault is not yours. You collect [your fee] from the people', that is what they tell me to do!" "There was a woman who came to see me and to request my assistance. I ate the mushrooms and advised her that she was to dig a hole to cure her *susto*. She was to dig the hole at the place where her *susto* occurred. Then she was to bring the earth she had excavated from that place back to her house where it was to be used to blow [*soplar*] upon her. She never did it! She returned to insist that I take the mushrooms another time which I did because of her need and her insistence. The second time the mushrooms scolded me. They asked me: 'Why do you comply with their wishes if they do not follow your advice? Why should you suffer from eating little [abstaining from the large meal of the day] when they do not pay you attention? Don't pay any attention to the capricious requests of the people!', that is what the mushrooms counseled me."

There now follows a description of observations made during a session in which Don Antonio ingested *Psilocybe Hoogshageni* Heim. The reader will readily note the infusion of moralistic injunctions incorporated in the communication of messages between "the children", the medium, and the

client. In this instance, the client was the senior author who requested a diagnosis and prognosis for his own mother who was critically ill in New York City.

Despite our having been informed previously by Don Antonio that Thursday was not a propitious day for diagnosis, other pressing matters related to our research on the *susto* phenomenon prevented our joining Don Antonio on a Wednesday, Saturday, or Sunday, and it was considered better to take a chance on an unpropitious Thursday than risk the later disappearance of the mushrooms, as the season waned in late August. Don Antonio accepted the logic of this argument and agreed to a session on an unfavorable day. However, the reader will note several references in the forthcoming text in which Don Antonio comments on the unpropitiousness of the day.

Our arrangement was to pick up the diagnostician at a place alongside the highway, drive in the jeep to another location, and proceed on foot to an isolated, depopulated hamlet, four hours walk from the highway. Unfortunately, a flat tire, and delays caused by highway construction caused Rubel and his interpreter to arrive several hours late.³ The delays made it impossible to walk to the hamlet before sunset, and neither Don Antonio or the interpreter relished walking the mountain paths in the cloud forest after dark. Consequently, it was decided to go to another, populated, hamlet alongside the highway. This alternative proved less propitious than the original plan because youngsters peered through the windows of the schoolhouse in which we prepared for the event. Moreover, instead of permitting the medium to collect the mushrooms in the security and privacy of the cloud forest surrounding the abandoned hamlet, he was subjected to the ridicule of the children who accompanied him as he picked the plants in our alternative site.

On arrival in the hamlet, Don Antonio immediately set about to locate the mushrooms which grew in profusion in the immediate neighborhood of the homes. He and the children quickly collected enough

³ Further references in the text to "the author," "the anthropologist," or "this man" refer to Rubel.

to meet his needs. It is worthwhile observing that he was aided by both boys and girls, and that as far as could be observed, neither he nor they made any special preparations for the task. No one washed their hands or other parts of their bodies, changed clothes, said prayers, crossed themselves, or in any other way prepared themselves for the collection of the plants. When the mushrooms were in hand, there seemed no special way of handling them while carrying them to the schoolhouse. However, Don Antonio showed care not to discard, or allow to be discarded, any of the mushrooms which were picked.

When Don Antonio decided that he had enough mushrooms, we retired with him to the empty schoolhouse where he awaited the dark of the night and the quiet that came with it. During our wait, the medium piled the ten mushrooms one on top of another, reminding me of a game of "pick up stix." When asked the significance of the number ten, he responded that *he* had picked only six mushrooms, but that the mischievous children had picked the other four. He commented that he had taken the other four from the children so that they—the four mushrooms in excess—would not feel mistreated.

Although, clearly, the act of collecting the mushrooms and the respect which surrounds the act of eating them in this hamlet show this occasion to be different from other, more mundane events, they could not be described as mysterious, a usage implying a religious experience.

The use of the term 'mystery' very aptly (Wasson, in Furst: 195) describes the preparation and ingestion of mushrooms among the neighboring Mazatec of Huatla de Jiménez (Ibid.; fig. 1 in Weitlaner & Cline; Weitlaner & Hoppe). There are several other differences in the collection, preparation, and use of mushrooms in Comaltepec compared with their treatment elsewhere in Mexico. Those differences will be discussed in concluding sections. However, it should be well noted that the problem of comparing the cultural usage of hallucinogenic mushrooms in Chinantec-speaking Comaltepec with that characteristic of linguistically different peoples in Mexico is

compounded by the fact that only one person regularly practices the eating of mushrooms in Comaltepec, making it difficult to distinguish between what may prove to be cultural behavior and that which possibly represents idiosyncratic behavior.

After dark, Don Antonio began to eat the mushrooms one by one without any perceived preparation other than an "Our Father" and a "Hail Mary" in Spanish which preceded the actual eating of the mushrooms by between 40 minutes to an hour. Rubel was startled by the matter-of-factness with which he set about eating the ten mushrooms, one by one, button end first, followed by the entire stem. Nothing was left, nothing set to one side. I say that I was startled because of reports which describe somber preparatory rites among contemporary Mazatec (Wasson, 1972), Mixtec (Ravicz: 80), Zapotec (Ravicz: 84), and Lacandon (Robertson, 1973).

Unlike all other reports of contemporary use of hallucinogenic mushrooms in Oaxaca (see Schultes, in Furst), these observations in Comaltepec are notable for the absence or rarity of ritual, magical connotations, or religious "mystery", but this is quite consonant with a general paucity of ritual in this municipio.

After ingesting the mushrooms, Don Antonio sipped at the *mezcal*, following which he became more friendly to me and inquired of me whether my body was *contento* (comfortable). I advise him that it was and inquired whether his body was also *contento*? He responded that it was. He requested us not to provide him with large amounts of *mezcal* when he requests a drink because he was not supposed to drink large quantities but, rather, to sip the *mezcal* from the shot-glass provided.

Because, during the collecting of the mushrooms, he had distinguished males (*machos*) from females (*hembras*) based on his understanding that the larger mushrooms were male, I enquired of him whether those he had eaten represented both male and female plants. He answered that he had eaten only males. I suggested that there had been some small mushrooms among them and asked were they not

hembras? He responded again by affirming that they had been all males.

He then asked me to describe my mother's condition to him. I described her as very ill, very weak, and so sad that, at times, she begins to cry. Her abdominal area has become quite enlarged although she does not eat much. He responded by asking whether her condition is not very frail? I answered that it was, but that at the present time she is not in the hospital, although she goes in and out of the hospital as her condition changes. I also informed him that she had been very ill for approximately three years. Don Antonio responded: "I do not know what to do, and neither do you. Let's see what these people [*gente* that is, the mushrooms] will say. Because that is what he wishes to know."

Then Don Antonio began to pray in Chinantec: "I do not attempt to mistreat you. I do this only in response to the problems which people have at home. I obliged myself to help this man, and he made an agreement with me, and here he is. I came to fulfill my part of the agreement. It is not that I wish to eat, you know. You are aware of what is happening. You know that others laugh and make fun of what I do, but also you can tell whether what they say about me is true. Well, that is the way it is! Yes, they try to ridicule us. They cannot! Well, let us see how many of the mushrooms I am able to eat?"

Then he informed us that the six mushrooms were equivalent to "six pesos. If it was someone other than him who came with me, they would be worth six pesos. I collected ten of them, but I feel able [*aguantando*] to eat only six. Only six will I eat, because these are fresh. Those that are left over I will keep, in order that they do not complain about me. If one were to throw them away they would complain. One digs them up because they are useful. One cannot simply throw them away. You dug them up for a reason, to meet a necessity, and cannot throw them away. However, if he wishes to take them away with him, he may do so for it is as if he had bought them now. I am going to keep them because I dug them up, and to throw them away would mean that they would suffer,

and then they complain". He then requested the interpreter to extend the straw mat (*petate*) on the floor because he was now ready to lie down.

Before he lay down, Don Antonio advised the interpreter that he had spoken to the mushrooms to advise them as to the reason for digging them up. He advised them that the reason was to answer my question about the health of my mother. I asked whether piling the mushrooms on top of one another before eating them had any significance. He answered that it had simply been to gather them together, but had no other significance. We then asked Don Antonio whether it was not true that one was supposed to take both males and females together [*revueltas*]? He answered in an interesting fashion: "It is not essential. They can be eaten—all males—when they are found like this [that is, when only males have been discovered]. In fact, the words of the males are of greater value. The men have greater value because they talk more and they appear in a more pretty form [*porque platican más y se ven más bonitos*]. If you eat them mixed together—men and women—then they arrive together [*revueltas vienen*]."

The interpreter then requested Don Antonio to advise us when he was hungry because we had brought much food for him to eat. The diagnostician answered: "That's what I like. People attend me well when they have a problem [*Así me gusta. La gente sí atiende bien cuando hay necesidad*!]." He then said that he would not eat until after the children [*los niños*] have bade him farewell, until after the matter was closed.

Don Antonio then asked us to request some hot coffee from the storekeeper. The interpreter suggested the possibility that hot coffee at this time might not be good for him. He responded: "I will drink it immediately while I am still hot because the mushrooms are cold, are they not?" When the interpreter responded that he, himself, had no idea whether they were cold or not, Don Antonio advised us that: "These mushrooms are cool [*frescos*] and will soon have an effect. If they had been dry, it would be more difficult". Don An-

tonio then sighed audibly, which led me to ask whether he was feeling sad. He said: "This act is difficult because when one commits himself to it, he must comply. It is difficult; I always worry when I commit myself to taking the mushrooms. I always worry because when I take the mushrooms, they always have an effect, and one is always frightened. That is because one always sees frightening, ugly things. It startles one. When you have taken many times, as I have, then you know that you will be frightened, and so I worry because the moment is arriving in which I will be frightened. It is always like this when the effects begin. One becomes sad. He is not content because he is unable to sleep well."

He then asked whether I had advised my mother that I was going to make an inquiry about her condition? I told him that I had not because she is far away in New York City. He then asked whether I have visited my mother, and I told him that I had paid her a visit in June and during last Christmas. Don Antonio then asked whether the tape recorder would make a record of the fact that he was not eating the mushrooms out of sheer whimsy but, rather, to the contrary, he does so to respond to my need to be informed about my mother's health. He repeated his anxious comments: "No es por mi gusto que tomo, pero por cierta necesidad!" He began to yawn very deeply and often, again expressing his fears of the effects to come: "Está difícil, éste!" The interpreter asked whether there was still time for him to go out for the purchase of hot coffee before the diagnostician was affected by the mushrooms. The latter reassured him about the time and stated that he would not go to sleep without hot coffee. As a matter of fact, he adds that he would like some hot coffee and that, at the present time, he is going to request a piece of the bread we have brought for him, ". . . so that I can eat it when the coffee arrives. In this way I will be strong [be courageous?] when the effects begin". [Amongst these Chinantec it is generally customary to drink hot coffee before retiring at night.]

We then left for coffee and on our return found him yawning deeply and sighing. He

advised that he was now ready to retire. At our request he repeated a prayer he says he pronounced during our absence. It proved to be an "Our Father" followed by a "Hail Mary," both in Spanish.

In response to several repetitions of a question by the interpreter as to whether that was the complete prayer, or whether there might be more, he continued with a Hail Mary.

He then began to eat the mushrooms. In the midst of eating them, he requested a bit more of the mescal. Then: "We will wait awhile until the smell [*olor*] of the mushrooms passes. Mientras tanto, se ponga silencio!" [In the meantime, be quiet!] He began to eat the mushrooms again after a brief respite during which he asked for a little more mescal. He announced: "I am going to eat all ten of the mushrooms in order that none be left over. Once and for all, I will eat them all, in order that none of them be lost! I usually eat only six, but I will eat all ten, then it would be like throwing the remainder away. They—mushrooms—could say to me: 'Why did you throw away our *compañeros*? It is as if they were *we* and you had thrown us away!'"

Don Antonio then asked of the interpreter whether there was mescal in the other bottle we had brought him. When told that it contained mescal, he answered: "Well, you are well prepared. Tomorrow you can give me the meat, if he has brought meat? Don't say anything to my brother. If he so wishes, he can leave the meat with my mother telling her it is for Antonio to eat." He then asked whether I have, indeed, brought him meat. I answered that I have eggs, and tortillas, and bread for him. He began to laugh when the interpreter advised that Antonio had already eaten the meat we had brought him in sandwiches while we drove along the highway.

He continued to talk, but became more and more disconnected and rambling. He suggested I give him some payment now so that when we go to the store on the highway tomorrow, we need not speak of payment in front of onlookers. In answer to his request for more mescal, the interpreter advised him not to get drunk, but he re-

sponded that he wanted more mescal because he felt like vomiting from the food he had just eaten. His conversation became more and more rambling as he became more and more loquacious in both Chinantec and Spanish.

He then asked: Is your mother's illness the only thing that you wish to find out? Perhaps there is no cure for her, for you say that she has been ill for three years." Following this, he either began to speak to himself or was whispering so low that we are unable to recover what he said from the tape. Then, again, he became more audible, speaking to the anthropologist. "I am pleased with the help that you have given to the *municipio*. I am very grateful! There are people here who have threatened me because I do not assist with the communal labor, something I am unable to do. There are those who have mistreated me because I have been unable to help. Perhaps sometime when you and I are together and these people mistreat me, you will tell them to desist because I am your friend. I feel very content because you are helping us. That is why I am making the effort to help you, if only a bit. Even though the people say to me that I have soiled myself for telling you what one is able to do [to speak with "the children" by means of hallucinogenic mushrooms]. I don't know what to do because this man already knows well what it is that I do! This man does favors for the people, too. By not charging for a ride in his automobile, he saves one a lot of money that it would cost for the fare. The people say that I am soiling the community because I tell you that I take the mushrooms. But you are someone who helps the people and assists the community and so I do what I am able to help you. I believe that we are now going to lie down. Let's see what he [Rubel] has to say about it. But first I will smoke a cigarette."

He lay down on his mat in a dark corner of the room, I tried to sleep in my hammock, and the interpreter tried to sleep on one of the benches. Several hours later, but long before dawn, Don Antonio was heard to be restless and began to speak, apparently to himself. I asked him whether "the children" had appeared to him. He an-

swered in the affirmative. He then continued: "They said to me that although it is not yet the proper time, it doesn't matter because you made an agreement with him [anthropologist] and he arrived here fulfilling his part of the agreement. You, too, complied with your word. That is the only proper way to do things.

"Los niños said: 'You have fulfilled your agreement with him.'" "I have met my obligation to him on that matter", said Don Antonio to me. "With reference to your mother, it is certain that she will not recover. But she will live a while longer. She is not going to die very soon, but neither is she going to recover to the condition she was in prior to becoming ill, because she is now elderly. That is the way it is!"

In response to a question from the interpreter as to whether there was not some other message in addition to that which he passed on to me, the response was: "One part ended with that. Then they said that he had best be careful wherever he went. Take care on the highway. Taking account of the condition of the roads where he goes, they are not very safe. Inasmuch as he relates well with the people, nothing will happen to him, because he is a nice person. Well, that is what 'the children' said! I only wish that you two could speak with them. If only you could hear their words. He [anthropologist] appreciates the people, so nothing will happen to him on the road."

I then inquired whether "the children" had told him what I was to do. He answered: "You must request a mass. For example, during this fiesta of ours which is approaching. That is, if you are present at that fiesta? If he really desires that this should come to pass then it will be necessary for him to request a mass. He should request a mass before the Virgen de los Remedios, that is, if he really wants with all his heart that which he is asking."

"They told me that 'We will meet this man afterwards', that is all that they said. They said to me, When a person wishes to speak with you, you also must be prepared to ask questions. That is why we are desirous of speaking, because this man wanted

to come this far with you'. They said to me, 'If this man arrived willingly with you because of his need to ask you a question, you should be willing, also'."

The interpreter asked whether that was all, to which Don Antonio responded that there was nothing else. He then added: "They told me more. They said: 'It is not important that we meet only once in a while, we and you remain the same towards one another'." Then, addressing himself to the interpreter, he began to importune: "They said that it is good that you are working with him. For example, when I am in need of help and that man is not here, then you will do me the favor of seeking help for me from him. In case he is not present, you will serve in his stead. You will favor me with something, according to my need. That is good that you have a friendship with this man and that the mushrooms are not opposed to you. Let us work together, you and I, with this man."

The interpreter asked whether there was more to the message? "Yes. They said that if he takes the trouble to ask for the mass, perhaps his mother will recover. Perhaps she will recover half of her former health. Because when the Virgin of the Remedios arrived, there was the flower known as 'flor de los remedios'. Because she blessed the whole world in order for that flower to exist."

Don Antonio then asked me whether his performance was good or bad. He asked whether I felt happy. I told him that I did not feel happy because he had not provided a remedy for my mother. "But that is why you are to request the mass. Your mother will recover because if you request the mass up there, the blessing will arrive in your country where your mother is. She sends her blessing with much ease. As your mother is of a very advanced age, it has been a long time that she has had this sickness. But she will recover by half." Then, to the interpreter: "Tell him, in order that he does not feel sad!" "Tell him that if he requests the mass he is not to tell people that he does so on Antonio's advice. He can tell them that he does so of his own free will. That is what he can do. That is

all that I can tell you. Let us see if he does this?"

In response, then, to a question from me as to whether the children had presented themselves to him in good humor or in bad humor, he answered that they had been in a good humor because: "They told me that this man is of good will, he really wishes to find out the answer to his question. 'It does not matter,' they said to me, 'that it is not the appropriate day. It is essential to comply with your arrangement when a person arrives truly desiring to know the answer to a question. When a person acts in good faith, even though it is not one of the proper days, one must respond to the inquiry. Whatever else, as he has met his agreements with the people and inasmuch as he has fulfilled his part of the bargain, you, also, have met your obligation. In that way, everything resulted well. It did not result badly! For, if you had not met your word, it would be bad.'"

Inasmuch as Don Antonio had advised in an earlier conversation that he sometimes saw animals, sometimes children (*los niños*) after eating the hallucinogenic mushrooms, the interpreter asked Don Antonio whether animals presented themselves this time. "Yes, the snake presented himself. The snake always appears. He always appears together with the octopus. These animals presented themselves after the children had appeared. The children say that these animals are for those people who do not marry, who do not become formally married, for those who only live together, but do not marry. Moreover, these animals are for those who do marry, but later become divorced. Like Martín, it is not good!

"They said to me that when persons call upon you, you must attend them. When you are in need, and it is critical, and you have nothing for your expenses, you should request aid of those who have. Ask them to help you when you are in need. Remember that time when this man called upon me to assist him? That is why I went, to be of assistance to him. It is not good when one has been offered a gift and immediately afterwards returns to that same person to request of him another gift. That is not right! Isn't that right, isn't it? It is

not good to wander about, shamefully asking aid of people. The people remember to whom they have previously provided assistance. It isn't correct to return again and again to the same people for aid. Do you recall that time when I arrived at this man's house and he gave me some money to help me? He helped me plenty that time. I am very grateful for it.

"I have still not slept; I am now going to sleep for a while. I have not lied. I now am going to sleep peacefully. I have not slept a wink. I have done a favor for him, and he did a favor for me. That is the way that I like it! I like it when we help one another in the face of need!"

SOME COMPARISONS

Although the preceding interviews and observations related to the ingestion of *Psilocybe Hoogshagenii* among highland Chinantec of Santiago Comaltepec suggest some degree of variance from what seems more general practice among other groups of Mexico, we shall dwell on the similarities demonstrated. The way in which Don Antonio and others of Comaltepec relate to the narcotic mushrooms is far more secular and matter-of-fact than is reported from other groups, and particularly from the Mazatec of Huautla de Jiménez from where there are good ethnographic reports (Heim and Wasson, Chapt. II: Munn). On reflection, the difference appears one of degree, rather than of kind. Indeed, as earlier suggested, the matter-of-factness with which the mushrooms are treated in Comaltepec is quite compatible with the general absence of rich symbolism in this *municipio*.

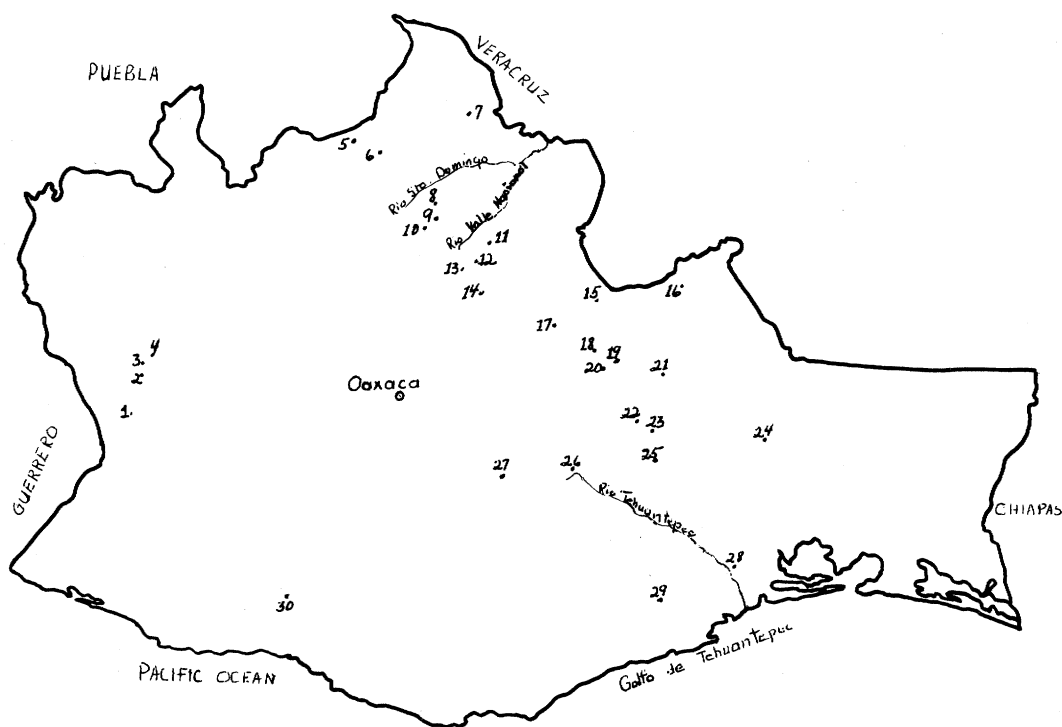
Data obtained in Comaltepec by means of participant observation and interviews indicate that there are many features which these mountain people share with others who are linguistically and geographically distant from them (Merrifield). But, as Miller (1966: 326) has properly emphasized, comparative ethnographic data is so thin and scattered with respect to the contemporary use of narcotic mushrooms that one attempts generalizations only with great caution. Miller warned that rather than suggest the existence of a single cult de-

voted to the use of hallucinogenic mushrooms all over Middle America, it should be borne in mind that even among villages of the relatively isolated Mixe, "... rites related to the use of mushrooms vary from one locale to another" (*Ibid*; cf., Ravicz: 90). Thus, keeping in mind the need for caution, we will emphasize only those traits from Comaltepec which appear to be of greatest significance and which are generally shared with other groups from which the use of these hallucinogens has been reported.

First, and perhaps of over-riding significance, mushrooms with narcotic properties are distinguished from others which do not have such an effect. The narcotic mushrooms are gathered only in order to respond to an individual's need to know the answer to questions of critical personal import: "What is the cause of my illness?" "What must I do to recover good health?" As is true elsewhere, but not universally, the mushrooms are collected in Comaltepec by *either* the diagnostician or the client for whom he will query the "little people"—*los niños*. However, in Comaltepec *only* the diagnostician eats the hallucinogens, and only he hears how "*los niños*" respond to his questions.

As is universally true in this region of the Sierra, in Comaltepec the mushrooms are ascribed special religious characteristics and treated with reverence. Unlike other localities, such as Mixe-speaking Camotlán in which the mushrooms are referred to as "Our Lords, the Earth's mushrooms" (Miller, 1966: 319), or as among the Nahuatl of San Pedro Nexapa who call the narcotic plants "The Noble Princes of the waters" (Wasson, 1963: 184), in Comaltepec, the personified mushrooms receive deference but not *such* great awe.

It is generally true in this area that the same techniques of prayer are used to solicit aid of the mushrooms as of other supernatural beings. Moreover, people do not arbitrarily discriminate between those supernatural figures which are post-conquest, and those which probably derive from pre-Christian periods. Although all reports indicate that narcotic mushrooms are revered in and of themselves, the ex-



THE STATE OF OAXACA, MEXICO

Fig. 1. Sites in which use of narcotic mushrooms is reported in the state of Oaxaca, Mexico.

- | | |
|------------------------------|------------------------------|
| 1. Santa Maria Zacatepec | 16. Santiago Yaveo |
| 2. Chayuco | 17. Teocalcingo |
| 3. Agua Fria | 18. Santiago Zacatepec |
| 4. Santa María | 19. San Juan Cotzocón |
| 5. Eloxochitlán | 20. Santa Maria Alotpec |
| 6. Huautla | 21. San Juan Mazatlán |
| 7. Soyaltepec | 22. San Lucas Camotlán |
| 8. San Juan Zautla | 23. Santa Margarita Huitepec |
| 9. San Juan Quetzalapa | 24. San Juan Guichicovi |
| 10. San Pedro Sochiapán | 25. Santa Maria Coatlán |
| 11. Santa Cruz Tepetotutla | 26. Juquila Mixes |
| 12. San Francisco Llagas | 27. Mitla |
| 13. San Juan Quiotepec | 28. San Jose Paraíso |
| 14. Santiago Comaltepec | 29. Tenango |
| 15. "Latani"—San Juan Latana | 30. Yaitepec |

tent to which they are independent of the will or control of other, perhaps more powerful, deities seems to vary. Don Antonio appealed directly to the mushrooms for counsel, whereas, in other communities mediating supernatural figures are invoked to ensure that the mushrooms will present themselves. (Wasson and Heim: 88; Ravicz:

80, 82; Munn: 90, 91). Mrs. Merle Robertson reports that among some Lacandon, the practitioners bypass Christian deities in order to go directly to pre-conquest deities: "They (*Psilocybe cubensis* and *Panaeolus venenosus*) are placed in the ritual bowls on small stone altars in ancient Maya *oratorios* (places of worship). The

purpose of their use, according to the Lacandons, is to contact their gods." (Personal communication.)

Surely one of the more interesting results of comparative research which Wasson, Heim and Weitlaner have done so much to inspire, is the discovery that hallucinogenic mushrooms have such similar effects across linguistic and cultural boundaries within Mexico. With remarkably little variation, that which is revealed to the taker of the mushrooms assumes the form of graphic, colored, and auditory experiences. The human forms which appear are approximately the stature of grown mushrooms, and these revealed "little people" speak in both the indigenous tongue of the medium, and in Spanish. To the contrary, in reports by European researchers—Heim, Cailleux, Hofman, and Brack—in which they describe the effects on themselves of relatively "controlled" dosages of the mushrooms, or of psilocybin extract, not a single researcher reports significant encounters with persons or animals, much less bilingual boys and girls or elderly people of small stature (Wasson and Heim: 273-4, 280, 282, 283, 284) during experimentation. Doubtless, what one experiences during such an occasion is a function of chemical *and* cultural influences in interaction as Miller (1966: 326, 327) and Munn (114, 122) appear to suggest. One also ventures to suggest, that individual personalities must play some part in the variations in response to the narcotic properties of the mushrooms, a premise which makes all the more interesting the similarity of responses reported from so many Indian individuals, living in so many different cultural milieux.

In Chinantec-speaking Comaltepec, and in at least four other Chinantec-speaking communities (Heim and Wasson: 99), the major function of the mushrooms rites is to diagnose and prognose illness. The important role of the mushrooms in healing have also been attested to among the Mazatec (Heim and Wasson: Chapter II; Munn), among some of the Mixteca (Ravicz: 77-8), Mixe (Miller, 1956, 1966; Hoogshagen: 313-4), Chatino (Wasson, 1966: 343, fn.), and Nahuatl (op. cit., 346). The second most often reported function of

the narcotic mushrooms in this region is for purposes of divining the whereabouts of an object or animal which has been lost or, perhaps, stolen. Utilization of the mushrooms to communicate with the dead seems restricted to Comaltepec (cf. Miller's commentary on séances, p. 326).

Finally, as Wasson has emphasized (1966: 166-70), despite widespread use, narcotic mushrooms are nowhere in the region taken whimsically or without serious consideration, preparation, and reverence. Its most general use is to acquire counsel from divine beings for diagnosis and prognosis of illness. However, by no means do *all* diagnosticians have recourse to, or even know how to exploit, the powers of the mushrooms. Whether or not those practitioners whose diagnoses depend upon the hallucinogenic mushrooms differ from other healers of the same community, along dimensions of personality, social status, or the manner in which they have been recruited to their healing responsibilities remain tantalizing questions to be answered only by empirical field research. Because of the rapid changes affecting the communities where these traditional practices of diagnosis and divination still survive, the time which remains for such badly needed research is distressingly brief.

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Studies of *Salvia divinorum* (Lamiaceae), an Hallucinogenic Mint from the Sierra Mazateca in Oaxaca, Central Mexico¹

L. J. VALDÉS III,^{2,3} G. M. HATFIELD,² M. KOREEDA,³ AND A. G. PAUL²

Salvia divinorum Epling & Játiva-M. is one of the vision-inducing plants used in ritual curing by the Mazatec Indians of central Mexico. The present status of research is summarized. Experiments with material collected at different Oaxacan sites confirmed that the mint has white (rather than blue) flowers with a purple calyx and that flowering is induced by short daylength.

Spanish *conquistadores* arriving in Mexico during the 16th century noted native medico-religious uses of vision-inducing plants such as *peyotl* (peyote, *Lophophora williamsii* (Lem. ex Salm-Dyck) Coult.), *teonanactl* (*Psilocybe* and related mushrooms), *ololiuhqui* (the morning-glories *Turbina corymbosa* (L.) Raf. and *Ipomoea violacea* L.) and others (Bourke 1891; Schultes and Hofmann 1980; Urbina 1899, 1903). The New World came under the jurisdiction of the flourishing Spanish Inquisition, and Indian utilization of hallucinogenic plants was anathematic to the clergy (Aguirre Beltrán 1973). The identities of *teonanactl* (flesh of the gods) and *ololiuhqui* were forgotten for centuries (Schultes 1941b; Wasson and Wasson 1957). Expeditions to remote areas of central Mexico during the 1930s found that isolated peoples, including the Mazatecs of northeastern Oaxaca, had continued to use hallucinogenic plants in ritual healing (Reko 1945; Schultes 1941a). The investigations of Wasson and colleagues were largely responsible for the introduction of Mazatec psychotropic plants to the outside world (Heim and Wasson 1958; Wasson 1962, 1963, 1980; Wasson and Wasson 1957; Wasson et al. 1974).

Along with rediscovery of ritual employment of mushrooms and morning-glory seeds, investigators reported the use of another divinatory plant by the Mazatec Indians. Johnson (1939) noted a vision inducing "tea" prepared from the leaves of an *hierba María* (The Virgin Mary's herb). Reko (1945) cryptically referred to some unidentifiable divinatory leaves he collected in the Sierra Mazateca. Weitlaner (1952) described a ceremony using a "yerba" *de María*. In 1957 Gómez Pompa collected non-flowering specimens (AGP 87556 and 93216, MEXU) of a purportedly hallucinogenic *Salvia* known as *xka* (*ska*) *Pastora* (the leaves or herb of the shepherdess). Later, Wasson and Hofmann obtained a flowering specimen without visiting the collection site (Hofmann 1980; Wasson 1962). They gave the plant to Carl Epling, who had revised the New World *Salvia* subgenus *Calosphace* (Epling 1939). Epling and Játiva-M. (1962) assigned this new species, *Salvia divinorum* Epling and Játiva-M. (Lamiaceae), to section *Dusenostachys* (containing about 10 other species) (Fig. 1–3).

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Fig. 1-3. Fig. 1. *Salvia divinorum* flowering in a coffee plantation on Cerro Quemado, Oaxaca (2 Mar 1980). Plant height 1 m. Fig. 2. *S. divinorum* at Matthaei Botanical Gardens (21 Nov 1980). Plant height 2.3 m. Fig. 3. Seeds of *S. divinorum*. Scale markings: 1 mm.

MAZATEC USE OF *SALVIA DIVINORUM*

There is little information concerning the Mazatecs' existence before arrival of the Spaniards. Twenty thousand people, including Don Alejandro Vicente, a *curandero* (healer) who was our informant, were forced to leave their homelands upon construction of the Miguel Alemán Dam during the 1950s (Barabas and Bartolomé 1973; Benitez 1973; Estrada 1977; Munn 1979; Villa-Rojas 1955; Weitlaner and Hoppe 1969). Don Alejandro told us that he used *S. divinorum* in ritual divination and curing (Valdés et al. 1983). The foliage is gathered as needed (it purportedly loses psychotropic activity on drying), although it may be wrapped in leaves of *Xanthosoma robustum* Schoff (and other spp.) to keep it fresh for a week. Only the leaves are employed in the preparation of medicines; a dose is measured by counting them out in pairs. Taken in small doses (an infusion prepared from four or five pairs of fresh or dried leaves), the plant acts as what we interpreted to be a tonic or panacea. It purportedly regulates eliminatory functions (defecation and urination) and cures "anemia," "headache," and "rheumatism." It also "cures" the disease "*panzón de barrego*," translated as a swollen belly caused by a sorcerer's evil curse. In large doses (an infusion made from 20 to over 60 pairs of fresh leaves) the plant acts as a mild but effective hallucinogen. The leaves may be eaten entire (Cortés 1979; Wasson 1962), but they are often crushed in water to prepare an infusion, which is then drunk (Hofmann 1980; Valdés et al. 1983; Wasson 1962). The infusion is often preferred to taking the leaves due to their extreme bitterness (our chemical investigations indicated this is probably due to high concentrations of water soluble tannins). Depending on the type of cure, *ska María Pastora* may be taken by the patient, the *curandero*, or both.

The Mazatec names for *S. divinorum* associate it with the Virgin Mary. When it is taken to induce a visionary experience, the "timidness of Mary" supposedly allows the vision to take place only in quiet or darkness. Given the *Salvia* infusion at Don Alejandro's home, Valdés (1983; Valdés et al. 1983) noted that village noises prevented full manifestation of its effects. However, on returning to the room where the researchers were staying, he underwent an experience that surprised him by the vividness of its apparent "reality." He found himself in an open meadow conversing with and holding on to a being in a white robe. It was an astounding visual, oral/aural, and tactile hallucination. Don Alejandro said the effects of the *Salvia* were quite similar to those produced by ingestion of morning-glory seeds. Taking an infusion of the morning-glory seeds under Don Alejandro's supervision at a later date, Valdés noted parallels between the two experiences. Both had a duration of several hours, and the subject eventually drifted off to sleep. A side effect common to both experiences was muscular incoordination. Because both plants are psychotropically weaker than vision-inducing mushrooms, Don Alejandro utilized them to a greater extent, since he felt they were less "dangerous." He told us that after becoming experienced with the *Salvia*, a prospective *curandero* progresses to the morning-glory seeds and finally to the mushrooms. The obscurity of this mint, its bitter taste, and a misunderstanding of its psychotropic effects have kept it from becoming a recreational drug (Díaz 1975; Foster 1984; Hofmann 1980; Valdés 1983; Valdés et al. 1983; Wasson 1962). Díaz (1975) reported that young people from Mexican cities travel

to the Sierra Mazateca and purchase dried leaves of *S. divinorum* to make into cigarettes and smoke as a marijuana substitute. The effect is reportedly milder than that of *Cannabis*.

CHEMISTRY OF *SALVIA DIVINORUM*

Hofmann was the first to isolate and identify the psychoactive ingredients in the Mexican mushrooms and morning-glory seeds. He later made chemical studies of *S. divinorum*, but was unable to isolate and identify the compound(s) responsible for the plant's activity in human beings (Hofmann 1964, 1980). Work by Díaz (1975) suggested that the *Salvia* contained alkaloids. In 1980 we began a bioassay-directed analysis of leaves from plants grown at the Matthaei Botanical Gardens. Two diterpenes (Fig. 4) were eventually isolated (Valdés et al. 1984); one of them caused sedation in mice when tested in a modification of Hall's open field (Brimblecombe and Greene 1962; Ryall 1958; Turner 1965; Valdés 1983). Normal mice remain active in the field for at least 30 min before finally resting; however, those given intraperitoneal doses of compound 1 were sedated in the field (compound 2 was inactive). Diterpene 1 is apparently not very toxic, as we have given it intraperitoneally to mice in doses up to 1 g/kg with apparent complete recovery after a few hours (the mice were observed for a week without incident; no necropsies were performed). Since the mice obviously could not report "visions," we also dosed them with mescaline (an hallucinogen), secobarbital (a sedative-hypnotic), a partially purified ether extract of *Cannabis sativa*, and a pharmacologically active diterpene, forskolin. All compounds produced sedation in mice when tested in the open field; that produced by mescaline was similar to the activity of the *Salvia* compound (unpublished data).

We named the new terpenoids divinorins A (1) and B (2), but later found that Ortega et al. (1982) previously isolated a compound, salvinorin, from *S. divinorum* that was identical to 1. Therefore the diterpenes should be known as salvinorins A and B, respectively. In our studies of the mint's activity we noticed that salvinorin A was not so active as partially purified *Salvia* extracts in the open field. Further investigations have led to isolation of more diterpenes structurally related to 1. We are presently in the process of characterizing and testing these compounds for pharmacological activity. If salvinorin A and the new compounds we isolated from the mint prove to display hallucinogenic activity in humans, it will mean addition of a new class of compounds (the terpenes) and eventually new plant genera to the psychotropic pharmacopeia. Diterpenes similar in structure to the salvinorins have been isolated from the ornamental *S. splendens* (Savona et al. 1978, 1979), as well as several other species of New World *Salvia*, none of which has been tested for pharmacological activity (Valdés 1983). Although only a few of the several hundred species in subgenus *Calosphace* have been chemically investigated to date, diterpenes could prove to be very useful as chemotaxonomic markers in determining relationships within the subgenus.

BOTANICAL OBSERVATIONS ON *SALVIA DIVINORUM*

Wasson (1963) suggested that *S. divinorum* might be the plant the Aztecs knew as *pipiltzintzintli* ("most noble prince" or "venerable little children"); this name has become associated with the mint in recent literature (Emboden 1979; Foster

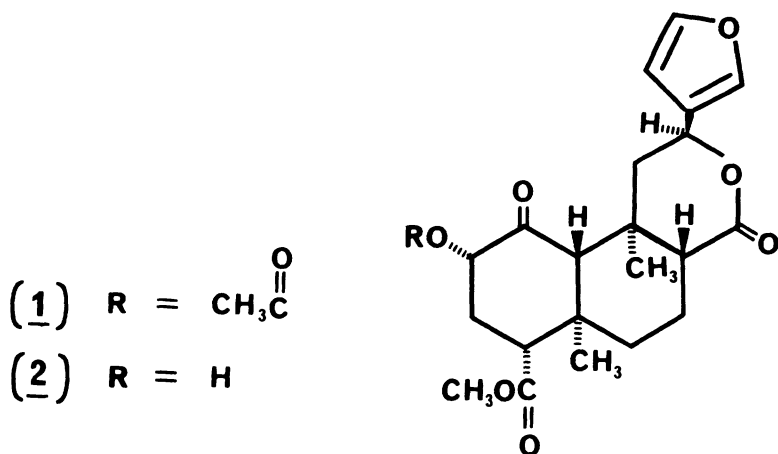


Fig. 4. Salvinorins A (1) and B (2) isolated from *S. divinorum*.

1984; Schultes 1976). Aguirre Beltrán (1973) summarized the data on *pipiltzintzintli* contained in the Inquisitorial Archives. It was apparently an hallucinogenic herb that had male and female varieties. All plant parts, including the roots and flowers, were used medicinally (no mention was made of the seeds), and it was cultivated for such purposes. Aguirre Beltrán, claiming that *pipiltzintzintli* was actually *ololiuhqui*, presented a convincing argument for his assumption. Investigations have shown that the leaves and stems (aerial portions) of both *Turbina corymbosa* and *Ipomoea violacea* contain significant amounts of the psychotropic alkaloids found in their seeds (Staba and Laursen 1966; Taber et al. 1963). Díaz (1979) cited a contemporary reference (Alzate 1772) that identified *pipiltzintzintli* as *Cannabis*. Although the morning-glories and cannabis are likely candidates, a precise botanical identification of *pipiltzintzintli* remains uncertain. Association of *S. divinorum* with the ancient Aztec plant is tenuous at best.

In describing *S. divinorum*, Epling stated that the flowers had a blue calyx tube and corolla, making an error that has endured in the literature (Foster 1984; Schultes 1976; Schultes and Hofmann 1980). Epling had a living specimen that he cultivated and presented to the botanical garden at the University of California, Los Angeles (accession 63-104). A living sample of this material is at the University of California, Berkeley (accession 76.100). After propagating material from these collections, Emboden correctly described the flowers as having a white corolla surrounded by a violet calyx (Emboden 1979, pers. comm. 1980). Until our expedition to Mexico, all *S. divinorum* growing in the United States was apparently descended from this single specimen (B. Bartholomew, pers. comm. 1980; D. S. Verity, pers. comm. 1980; R. G. Wasson, pers. comm. 1980).

Salvia divinorum is reported to be a cultigen that rarely blooms (and then only when the branches are over 7 ft long) and apparently never sets seed (Emboden 1979; Foster 1984; R. Ornduff, pers. comm. 1980; Wasson 1962). Nothing is known about natural pollinators, but the plant is parasitized by several species of insects (Díaz 1975). Don Alejandro told us that *ska María Pastora* could be found over wide areas of the Mazatecan highlands. But Cerro Rabón is a tall (2,100 m) and still relatively inaccessible mountain. Mazatecan legends consider

it to be a semidormant volcano with a magical lake at its summit. It is supposedly populated by local gods, demons, and magical beings (Benitez 1973; Espinosa 1961; Incháustegui 1977). Therefore, after observing the localities in which the *Salvia* grew, we believe the mint is collected in the highlands and planted in more accessible places, where it becomes naturalized. It is doubtful that the *Salvia* is a true cultigen. Among flowering specimens we collected on Cerro Quemado, one (Fig. 1) was only about 1 m tall. We saw remains of flower spikes in a stand on Cerro Rabón near the village of Ayautla. Seeds (i.e., mericarps) were not found at either site. During our conversations, Don Alejandro told us that the flowers produced seed that could be planted to grow the *Salvia*. While growing it for chemical research, we performed experiments that clarified some of the botanical questions surrounding the plant.

In addition to our collections of living specimens from both sites, we were able to obtain cuttings of plants asexually propagated from the original specimen obtained by Wasson and Hofmann in the village of San José Tenango, Oaxaca (B. Bartholomew, pers. comm. 1980; D. S. Verity, pers. comm. 1980; R. G. Wasson, pers. comm. 1980). From herbarium sheets of Oaxacan collections, we noted that flowering specimens were collected only between late August and March, a time of short days (Valdés 1983). In Mexico City (which is not far north of the collection localities), daylength reaches a maximum of 13 h in June and decreases to about 12 h in October (Salisbury and Ross 1978). Although most plants affected by daylength need exposure to a certain critical dark period to begin the development of flower buds, some need a tapered decrease in daylength to induce flowering (Bickford and Dunn 1973). Using this information, we devised a series of experiments.

FLOWER INDUCTION EXPERIMENTS

Preparations

Round plastic pots of 25 cm diameter and 25 cm depth were filled with a mixture of topsoil, peatmoss, vermiculite, and perlite (4:2:1:1 vol/vol). A rooted 10–20 cm *Salvia* stem cutting (two or three nodes) was placed in each pot. Plants were watered as necessary. They were fertilized weekly with 1.0 l of a 2 tsp/5 gal solution of a 15-30-15 soluble fertilizer containing trace elements (Stern's Miracle-Gro®, with 0.05% each of Cu, Mn, and Zn as the sulfates and 0.1% Fe as a chelate) with 1 ml of an 85% phosphoric acid solution added to counteract basicity. This routine was used for all experiments.

Outdoor and greenhouse experiments

About 50 plants were cultivated in an Ann Arbor garden during summers. They were put in a greenhouse (Matthaei Botanical Gardens) in September 1980 and placed on 28 in tall 6 ft by 17 ft benches. Minimum greenhouse temperature was 10°C; maximum temperature (10–30°C) depended on outside conditions.

Experimental results

Buds were observed in late October. Flowering began on 10 Nov and continued until early January 1981. All specimens bloomed. Similar results occurred during

1981 and 1982. In autumn 1983 another research group used artificial lighting to extend greenhouse daylength, which caused the *Salvia* to abort flowers and revert to vegetative growth.

In the greenhouse at a northern latitude *S. divinorum* elongated rapidly several feet in height shortly before flowering (Fig. 2). Although the mint was normally nearly devoid of odor, its upper leaves and flowering stalks became strongly aromatic as buds developed. We always observed pubescent white flowers with a purplish to blue-violet calyx. Sometimes, just before opening, the tip of the corolla displayed a lavender tinge, which eventually disappeared. The corolla was usually shed within 72 h after complete opening.

Plants collected on Cerro Quemado were crossed with descendants of Epling's original specimen on 19 and 21 Nov 1980. Previous trials and other information (Emboden 1979; R. Ornduff, pers. comm. 1980) indicated that the species is probably self-incompatible. Of 14 hand-pollinated flowers (later protected by glassine envelopes), four set seed, which was collected on 16 Dec 1980 (Fig. 3). Our attempt to grow the seeds in a growth chamber failed when it overheated to 75°C, drying their medium and killing them (the mature plants in the chamber died to the soil level, but soon grew again).

Growth chamber experiments

Sherer Environmental Chambers models CEL-512-37 and CEL-34-14 were freshly outfitted with incandescent (93 W) and cool white VHO fluorescent bulbs. Eleven plants from each of the three sources were divided between the two chambers. Plant-top light-intensity varied from 2,800–3,300 ft-c, depending on plant height and the chamber involved. Controls were set for maximum relative humidity (measurements varied between 50 and 100%). Temperature was set at 22°C day (16 h) and 17°C night (8 h). Plants were grown under these conditions for 12 wk. Beginning 24 Jan 1980, daylength was decreased from 16 to 11 h over a 4 wk period.

Experimental results

Buds were noted on 4 Apr 1980; flowering branches were collected on 20 Apr 1980 (*Valdés s.n.*, 22 Oct 1980, MICH). All plants flowered at a height less than 1.0 m; the flowers had a purplish calyx and white corolla. Repeating the experiments with an abrupt change from 16 h to 11 h days indicated tapered decreases in daylength were not necessary to induce flowering. Increasing daylength to over 12 h caused plants to revert to vegetative growth and abort flowers (*Valdés s.n.*, 15 Jun 1981, MICH). Later a malfunctioning timer switch indicated that less than a week of 24 h days induced this reversion, even if conditions were returned to short (11 h) days.

DISCUSSION AND CONCLUSION

The greenhouse and growth-chamber experiments indicated that *S. divinorum* is an obligate short-day plant. Plant height is a minor factor in flower development, as several (growth chamber) specimens were less than 0.5 m tall when they flowered. Pollination experiments showed that the mint is probably self-sterile, but it remains to be demonstrated that *S. divinorum* will set viable seed.

To test for the hallucinogenic activity of *S. divinorum* in human beings, we drank the infusion of the leaves and waited for the effects to occur. Within 30 min we began to see visions, which lasted for several hours. This allowed rapid confirmation of the mint's psychotropic activity. But more interesting from a therapeutic standpoint are the other properties attributed to the plant; properties that are much more difficult to assess. Are these concepts that are translatable into our western (orthodox) healing theory, or is *ska María Pastora* being used as a magical treatment (for a placebo effect)? Extended observation in the field by an acute observer would undoubtedly be more fruitful than immediate attempts to isolate compounds responsible for these purported activities.

Although all recent information about the use of this mint has been gathered from Mazatec informants, the early reports of Reko and Weitlaner indicate that other tribes may have used it also. Reko (1945) alluded to use of the divinatory leaves by the Cuicatecs (in the district of Cuicatlán) as well as by the Mazatecs. Weitlaner (1952) noted that a plant called "*yerba*" *de la Virgen* was used for divination by the Otomi people of Tulancingo in Hidalgo and suggested it could be the same species as the "*yerba*" *de María* used by the Mazatecs.

Much botanical work remains to be done on *S. divinorum*, from further investigations of its range, habitat, pollination, and distribution, to a final unraveling of the taxonomic and genetic questions that have been raised about the plant and its relationships within the genus.

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On the Use of *Tagetes lucida* and *Nicotiana rustica* as a Huichol Smoking Mixture: the Aztec "Yahutli" with Suggestive Hallucinogenic Effects

R. K. SIEGEL, P. R. COLLINGS, AND J. L. DIAZ ¹

INTRODUCTION

The history of tobacco in New World societies is replete with many examples of its use as an hallucinogen. In such cases, tobacco is often mixed with other substances which may contribute to the psychopharmacological effects. Recently, one such mixture was found to be used by Huichol Indians in Mexico, and the patterns of its use are discussed below.

There are more than 60 species in the genus *Nicotiana* but only two of them are cultivated for use as tobacco: *N. tabacum* and *N. rustica*. The former is the tobacco of commerce used throughout most of the world, while the latter is grown extensively in parts of eastern Europe and Asia Minor as *tombac* or *tönbeki* (Wolf, 1967). *N. rustica* also grows wild in the high Sierra Madre mountains of Mexico, where it is called *yé* (from the Aztec *yetl* meaning tobacco) or *ya* by the Hucihol Indians who use it ceremonially (Myerhoff, 1974). *Yé* is

considered to be the tobacco of the fire god Tatewari and, according to Huichol folklore and mythology, was reportedly once a hawk (Furst, 1972, p. 176) and "is said to give one visions" (Myerhoff, 1974, p. 126). Myerhoff describes its exclusive use in the traditional peyote hunts. "It is sacred and used only ceremonially, when all the men smoke in unison. Rolled into maize husk cigarettes, the tobacco is carried to Wirikuta in the sacred wart gourds (*yékwei*) worn by older men and experienced *peyoteros*" (Myerhoff, 1974, p. 126).

Many other New World societies use tobacco in shamanistic practices. In many such practices, tobacco is often conceptually and functionally indistinguishable from true hallucinogens (Janiger and Dobkin de Rios, 1973; Wilbert, 1972). The Warao Indian of Venezuela, as part of his vision quest, smokes tobacco and fasts, falling into a trance or ecstatic dream state in which "he feels exalted and euphoric with the marvelous sound [of spirits], embarks on his initiatory journey across the celestial bridge and its rainbow of colors" (Wilbert, 1972, p. 70). Similarly, tobacco is added to the Peruvian *tabaco* liquid to give the power to "visualize" and to "clear" the mind (Sharon, 1972, p. 129). Tobacco is also used in massive doses by the Campa shaman of eastern Peru and is "credited as the general source of a Campa shaman's powers to see and communicate with the

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spirits and to cure or to diagnose illness" (Weiss, 1973, p. 43). Schleiffer (1973) cites several texts on the use of tobacco by New World Indians whereby "high visions", "a long sleep filled with peculiar dreams", and "imaginings" were produced. The classic study by Lewin (1931) also contains numerous references to hallucinations induced by tobacco (p. 286 ff).

While such reports have probably generated much of the folklore concerning hallucinogenic properties of tobacco (cf. Fairholt, 1859; Folkard, 1884), notes from recreational tobacco users also indicate a wealth of visions and hallucinations. Early botanists and herbalists even described tobacco as related to the genus *Hyoscyamus* because of its "narcotic quality" and called it a "third kind of henbane" (Brooks, 1952). Arents (1937) suggests that the yellow-flowered *N. rustica* was originally called *Hyoscyamus Peruvianus* (Henbane of Peru) because of confusion with the yellow-flowered henbane. One 1574 account described tobacco as producing "visions and illusions", used by natives in the West Indies "so that they might see imaginary things and fantasies which it reveals to them" (in Dickson, 1954, p. 87). Indeed, Lane (1845) reports that tobacco, when used by certain individuals or in conjunction with alcohol, can produce visions similar to those obtained with opium: "He [the tobacco smoker] may see thousands of strange forms floating in the tobacco smoke. He may people it according to his temperature with agreeable or revolting images—with flowers and gems springing up as in dreams before him—or with reptiles, serpents, and the whole host of *diablerie*, skimming like motes in the sunshine, amid its curling wreaths" (pp. 103–104). Shaw (1849) provides an interesting account of a man overcome with tobacco fumes and "soon afterward he was harassed by wild and frightful dreams" and, upon recovering, "he acquired a most vivid recollection of a vast variety of ideas and events which appeared to have passed through his mind, and occupied him during the time of his supposed insensibility" (pp. 31–32). Even withdrawal from chronic

tobacco smoking is said to be marked by similar visions (Cowan, 1870). Zalackas (1902) reports two cases of nicotine psychoses resulting from excessive tobacco smoking. These states were characterized by vivid visual and auditory hallucinations. Pain and Schwartz (1908) report a case of a man who had visions and auditory hallucinations whenever he smoked. Larson and his co-workers (1961) review numerous other case reports of tobacco smoking and cite several symptoms which have been reported including vertigo, disturbances of sleep, transient disturbances in consciousness, as well as specific diseases of sight and hearing, including tobacco amblyopia. In most such cases of tobacco-induced hallucinations, users adopt a method of violently inhaling and swallowing the smoke in order to induce stupor and intoxication—a method shared with the Huichols (cf. Arents, 1937).

HUICHOL USE OF *NICOTIANA RUSTICA*

Nicotiana rustica, the tobacco of the Huichols, grows wild and cultivated in Nayarit and Jalisco. The Huichols prefer to plant in soil containing the ash of burned trees or logs, although no other mineral or organic fertilizers are used. The ash is alkaline and a good source of potassium, phosphorous, and potash. During cultivation, topping and suckering practices are employed, and these result in an increase in size and thickness of the leaves. The entire plant is usually harvested at one time, but some Huichols employ the priming method in which leaves are removed at successive intervals as they mature. Nonetheless, all the leaves and some stalk material are eventually smoked as the tobacco is chronically in short supply among the people. The tobacco is cured by air or sun and used immediately without planned storage or aging.

The tobacco is usually rolled into maize husk cigarettes, although clay pipes are also employed. During ceremonial periods, smoking is done in groups and almost continuously during the daylight hours for periods up to four days. Tobacco smoking is also engaged in by the Huichols (both

men and women) for non-ceremonial or recreational purposes, including smoking after meals and in the evening while sitting around the fires. Such smoking has been observed in both solitary individuals as well as in groups. The relative extent of this recreational use is governed by the supply of tobacco, ceremonial uses during deer and peyote hunts and peyote feasts taking first priority. The pattern of smoking consists of long deep inhalations and respondents report tiredness, dizziness, and "images seen with the eyes closed".

One explanation suggested for these effects is that they are nicotine-induced, since nicotine is the principle pharmacologic agent in tobacco and markedly stimulates the central nervous system. Furst (1972) has claimed that *yé* contains nicotine in far greater amounts than domestic brands (p. 176), but his report does not provide the source of this information. We analyzed three different samples of *yé* (*N. rustica*) obtained from San Andes Coamiata (Jalisco) and Banco de Calitice (Nayarit), two Huichol communities. The San Andres sample was found to contain $3.89\% \pm 0.05\%$ nicotine (% dry weight of leaf) while the Banco de Calitice samples contained $4.03\% \pm 0.11\%$ and $1.89\% \pm 0.02\%$ nicotine. These nicotine levels are somewhat high when compared to cigarette tobacco (*N. tabacum*) used in the United States (average 1.5%, range 0.7 to 3.0%). However, *N. rustica* usually has a higher nicotine content than *N. tabacum*, and African grown samples of *N. rustica* have averaged 4.5% to 8.6% nicotine (Watt and Breyer-Brandwijk, 1962). The samples of *yé* analyzed here are not, therefore, markedly high for its species.

Recently, Janiger and Dobkin de Rios (1973) have noted that conditions of cultivation and growth may effect changes in the chemical composition of tobaccos, in particular the Beta-carbolines which are hallucinogens present in small amounts in cured commercial tobaccos and their smoke. Pharmacologically, it would seem more reasonable to suspect psychopharmacologic activity from these substances, especially harman and norharman, rather

than nicotine which has no proven hallucinogenic properties. In addition, among the 900 identified constituents in tobacco smoke (Wakeham, 1972), there are other compounds with known hallucinogenic effects including carbon dioxide, myristicin, and trace amounts of nitrous oxide and related nitrites. Also, several deliriantes are present in the smoke, and these include acetone, benzene, cyclohexane, hexane, toluene, and various ketones (Wynder and Hoffman, 1967). However, all of these compounds appear to be present in such small amounts, at least in commercial tobaccos, that the suggestion of endogenous hallucinogens present in tobacco in behaviorally active amounts must be viewed with caution. Alternatively, a particularly attractive, albeit speculative, notion is that unknown ingredients are mixed with the tobacco, and these might contribute to the observed effects.

TOBACCO MIXTURES

The practice of mixing tobacco with other substances is common to shamanistic rituals in several New World societies. For example, the Warao Indians mix their black tobacco with the fragrant resin of the *Curucay* or *Tacamahaco* (*Protium heptaphyllum*) tree (Wilbert, 1972); the shaman of the Jivaro Indians of the Ecuadorian Amazon drink tobacco juice in large quantities mixed with the extract of another drug, *natemä* (*Banisteriopsis caapi*) as well as with *piripiri* (Harner, 1973); San Pedro cactus (*Trichocereus pachanoi*) is often added to tobacco and several other ingredients to produce *tabaco*, a liquid used ceremonially in Peruvian folk healing (Sharon, 1972); tobacco is drunk along with beverages of *B. caapi* and *Datura* by the Campa *sheripiari* or "tobacco shaman" of South America (Wilbert, 1973); in areas of South America tobacco snuff is sometimes mixed with coca (*Erythroxylon coca*) or *Anadenanthera peregrina* (Wilbert, 1973); and in Mexico, the leaves of *Ephe-dra nevadensis* are mixed with tobacco and smoked for relief of headaches (Heffern, 1974).

Kamen-Kaye (1971) described an unusual

form of tobacco in Venezuela called chimó which is chewed, smoked, and sniffed to prevent hunger and fatigue and for medicinal purposes as well. Chimó has a variety of additives including tonka bean (*Dipteryx odorata*) for vanilla flavoring; anise (*Pimpinella Anisum*) to reduce the harshness; cloves (*Eugenia caryophyllata*), cocui liquor (from *Agave Cocui*); nutmeg (*Myristica fragrans*)—an hallucinogen; vanilla (*Vanilla planifolia*); crude brown sugar (*Saccharum officinarum*) for sweetening; opium; and leaves of *Palicourea Chimó* and those of at least two other rubiaceus species. Chimó is also used with plant ash, an alkalizing agent which accelerates and intensifies the action of nicotine in man.

In North America, the medicine pipe used by the Shoshone Indians contained a mixture of tobacco and Desert Trumpet (*Eriogonum*), while the Paiutes used a smoking mixture of tobacco and "Kinnikinnick"—the latter being a mixture itself of several plants including Quinine Bush (*Garrya elliptica*), Bear Berry (*Arctostaphylos uva ursi*), Prince's Pine (*Chimaphila umbellata*), and Sandwort (*Arenaria* spp.) (Van Allen Murphey, 1959). Other North American Indians frequently mixed tobacco with nutmeg for medicinal purposes (Dickson, 1954, p. 103). Still others, particularly the Delaware Indians, mixed tobacco with sumac leaves (*Rhus glabra*) for pleasure, relaxation, and because its distinctive scent acted as a territorial marking for members of the tribe (Weslager, 1973). Schultes (1937) reports that sumac leaves were believed to make the tobacco smoke more potent as a purifying agent and this was used among American Indians in peyote ceremonies as well as in recreational settings.

Arents (1937) reports that American Indians, as well as Australian aborigines, chewed tobacco mixed with lime. This practice is similar to that observed in India where *N. rustica* and *N. tabacum* are often chewed together with lime, betel nut, and betel leaf (*Areca catechu* L.) which contains the active alkaloid arecoline. Other tobacco additives used in New and Old World societies and reviewed by

Arents include: vinegar, amber, rosemary, cinnamon, milk, oil (to bind the dust), incense, coltsfoot and yarrow, elephant feces, cow feces, woodshavings (when tobacco is scarce in Argentina), sugar saffron, sassafras, calamus aromaticus, sage, lavender, cubeb, leave of berry bushes, hemp (in Africa), inner bark of the cherry tree, anise oil, pepper, marjoram, and aloes. Lewin (1931) reports that the following substances have been used with tobacco or as a substitute for it: *Aristolochia triangularis* and *A. galeata*, *Anthurium oxycarpum*, *Carica papaya*, *Leonotis Leonurus*, *Vaccinium stamineum*, *Salix purpurea*, *Cornus stolonifera*, *Arctostaphylos glauca*, *Kalmia latifolia*, *Chimpahila umbellata*, *Cestrum parqui* (palguin), *Caltha palustris*, *Arbutus uva ursi*, *Polygonum orientale*, cane; fibres of *Hibiscus*, *Curatari guayensis*, and *Lecitnys ollaria*; and, flowers of *Emacipata fumans vulgaris*.

HUICHOL USE OF *TAGETES LUCIDA*

In 1973, one of us (PRC) found that the Huichols smoke another substance they call *tumutsáli* or *yahutli*. *Tumutsáli* is smoked either by itself or in 50% mixtures with *yé* and is used both recreationally and ceremonially. However, since *tumutsáli* is always in more abundance than *yé*, it is often used exclusively by the Huichols.

We identified *tumutsáli* as *Tagetes lucida* Cav., a member of the Compositae. Another member of this family is *Calea zacatechichi*, a popular Mexican folk medicine with reported hallucinogenic effects (McDougall, 1967; Schultes, 1970). The genus *Tagetes* is native to the New World and the use of its flowers for religious ceremonies in Mexico and Guatemala appears to date back to pre-Columbian origin (Kaplan, 1960). Such uses most commonly involve ceremonies for the dead. It has been suggested that *T. lucida* is the "*yahutli*" of the ancient Aztecs (Reko, 1919; Thompson, 1933). The evidence is based on abundant early descriptions of *yahutli* which are remarkably similar to *T. lucida*. In addition, we have found that at least one tribe of Huichols use the word *yahutli* in reference to this plant, although *tumutsáli* is

more common. *Yahutli* was an important plant for the Aztecs and it is mentioned in the three major sources of medical botany for 16th Century New Spain. The Badianus Manuscript contains a figure (Plate 34) and description of a plant called *yyah-hitl* (de la Cruz, 1964), a name that appears to be derived from the word *ujana* which means to offer incense in sacrifices (Emmart, 1940). This suggests that the plant had a pungent and fragrant odor. Hernández (1959) describes *yyahutli* or *hierba de nube* (cloud shrub) which "stimulates veneral appetite, alleviates crazy people and those astonished and frightened by the thunder". Sahagún (1959) mentions that the powder of this plant was thrown in the faces of captives to "dull their senses" before being sacrificed to Heuheuotl.

T. lucida has also been referred to as Yerbanis, Santa María, and pericón by von Reis Altschul (1973), while other species carry the names "Flor de Muerto" or "Rosa de Muerto". Martínez (1944) describes pericón as *T. florida* Sw. and lists the other vulgar names as Anisillo, Hierba anis, and Flor de tierradentro, among others. This latter reference describes the various species which grow in Nayarit as Cempoal and adds that a "Flor de Muerto" is narcotic and mildly toxic".

Popular Mexican uses of *T. lucida* include use as a bath additive for fragrance and rheumatism; as a tea for relaxation, sleep, and slight ailments; as a juice for relief from the itching and pain of insect bites; and as a fumigant and insect repellent. The latter use probably evolved from the strong licorice smell of *Tagetes* flowers (von Reis Altschul, 1973). In Texas, the Navajo Indians use the Little Marigold (*Tagetes micrantha* Cav.) for colds, fevers, summer complaints, and stomach troubles (Burlage, 1968).

In many communities in Mexico, the "Fiesta del pericón" takes place on September 28 and 29. *Pericón* is at the peak of its flowering cycle at this time and the women and children collect the plant on the first day of festival. In the afternoon and evening they tie together two handfuls of the plant in the form of a cross and nail it to

the upper part of their doors. The cross remains there all year, until a new one replaces it. On the next day, a procession goes to sacred places or to the church where *pericón* is offered in altars and burned. This ceremony is based on a belief that an evil spirit or a devil "gets loose" during the night and roams around until dawn, when he is defeated by St. Michael. It is believed that the cross is protection against the devil and prevents him from entering one's house. One of us (JLD) has found this "Fiesta del pericón" in the valley of Cuernavaca (Morelos) and in the Mixteca Alta region south of Tlaxiaco (Oaxaca). However, the ritual use of *pericón* in modern Mexico is not restricted to this celebration. For example, in Tlaxiaco we have found that it is also used in baptisms as a fragrant, ornamental and ceremonial flower. In Morelos it is present among other plants in the magic ceremonies of the *limpia del aire*. Interestingly, the shaman who performs this ceremony knows about the psychotropic effects of "excesses" of *pericón* (Scott Robinson, personal communication).

Tagetes lucida grows well throughout Mexico and is in particular abundance in the states of Nayarit and Jalisco. In the Huichol communities in San Andres Comiata (Jalisco), the plant grows at about 2100 meters and begins to bloom in July and reaches abundance in October. The Huichols break off the top six inches containing the flowers and small leaves, tie them into bundles and hang them up to dry in the houses. The plant is also picked by the Huichols and the fresh leaves and flowers crushed and held against the face for hours at a time as an aromatic inhalant. The bundled plants are used as religious offerings in temples, government benches, and sacred shrines.

When the bundled plants to be used as smoking material are dry, the leaves and flowers are crushed and smoked in long thin maize cigarettes or clay pipes. The Huichols also mix it with *yé* and claim that it reduces the harshness of *yé*, facilitates deep inhalations, and facilitates intoxication. The intoxication itself is

marked by quiescence, lying down, a fixed gaze, and frequent periods of closed eyes. Often, the smoker would turn away from the night fire and face the darkness, a behavior reminiscent of the mara'akame shielding his eyes from the fire in order to facilitate visual imagery. Several Huichols reported visions and images with closed eyes and these were said to be similar to their experiences with peyote. Such visions were usually accompanied by nausea and vomiting.

In ceremonial uses, the Huichol smoking of the *yé/tumutsáli* mixture is frequently accompanied by ingestion of peyote, *tesquino* or *nawa* (fermented maize drink) *cái* or *sotól* (cactus distillate), and tepe (another alcoholic beverage). Such combinations inevitably produce extremely vivid hallucinations, but less intense visions are obtainable with the smoking mixture alone. Even when other drugs are not used in the peyote ceremonies, the Huichols will continually smoke the mixture throughout the entire night as the mara'akame sings.

CONCLUSION

While the psychoactive properties of the *N. rustica*/*T. lucida* mixture must await further chemical and psychopharmacological identification, it remains possible that the mixture is not hallucinogenic *per se*. Rather, it may be speculated that the smoke itself is inherently evocative of visions and mystery—a natural medium for shamanistic practices. This thesis was originally stated by Brooks (1952): "Tobacco fully met the conditions which primitive people required of a plant set aside at first for magic or ritualism. It contained an element which could induce a form of trance, it was readily consumed by the cleansing power of fire, its perfumed smoke arose subtly to the abode of the gods, and it had other virtues of magic. From the immaterial, visible substances of smoke, dreams could be materialized" (p. 21). Other virtues of magic may have included tobacco smoke's use as a "smoke-screen" to conceal the movements of shamans (Arents, 1937). Mason (1924) notes that in Mexico and South America the smoke

could also be blown to cardinal points or onto affected parts of people undergoing curing. The white clouds of tobacco smoke are also suggestive of and associated with rain clouds and play an important part in many ceremonies for securing rainfall (Mason, 1924, p. 8).

The Huichol ceremonial use of tobacco may have arisen from similar customs elsewhere. Their practice of mixing *yé* with *T. lucida* may have evolved from the Aztec use of *yahutli*. Or, perhaps the mixture evolved from the Aztec practice of mixing tobacco (*yetl*) with many aromatic substances, principally *Liquidarbar stryacciflua* (Mason, 1924). According to the 1790 edition of Hernandez (cited in Guerra, 1971, p. 138), *liquidambar* or *Xochiocotzo-quahuítl* was mixed with tobacco to strengthen the head, induce sleep, and mitigate headaches. Another possibility is that the well known properties of *T. lucida* as an insect repellent may have become attached to spiritual matters and used to cleanse the body through smoking, thus functioning as it does as a bath additive or symbolically in the *Fiesta del pericon*. Such curative uses of smoking mixtures are not uncommon in New World societies. For examples, the Tarahumara shamans mix tobacco with the dry blood of *sope-chi* (bat) and the dried meat of the *muri* (turtle) to purify and protect against the evil of witchcraft.

It also is possible that there were or are several distinct *yahutli* plants which could account for the wide range of alleged effects. Flores (1886) lists 12 separate medicinal uses for *yyauhtli* (pp. 96, 198, 223, 234, 235, 237, 240, 241, 247, 252, 256, 259) and only three appear in lists with tobacco and only one in a list with *cempoalxochitl* (*Targetes erecta* L.). The de la Cruz-Badiano Aztec herbal of 1552 (1939) lists a number of *yauhtli* plants, including *quauhyauhtli*, which is identified as absinthe. And Soustelle (1955) actually identifies one such *yauhtli* as *Cannabis*: "The fire-god's victims, anaesthetized by *yauhtli* (hashish), were thrown into the blaze". Such a use of *yauhtli*, if actually effective, is better understood as an action of the tetrahydro-

cannabinols in *Cannabis* preparations rather than the apparently subtle, albeit unknown, pharmacologic principles in *Tagetes* spp. Since *Cannabis* was not in the New World in Aztec times, still other psychoactive substances must have been used as *yahutli*. A particularly attractive notion is that some species of *Datura* or *Solandra* was used. The relatively potent amounts of scopolamine and atropine in these latter species could account for the anaesthetic effects, and North American Indians, especially the Algonquin, have an ancient practice of mixing *Datura* with their tobacco and experiencing hallucinogenic effects (Smiley, 1975). Furthermore, the Huichol use of *Kiéri*, identified as *Solandra* or *Datura*, shows an historical familiarity with these compounds. Yet another *yauhtli* may be simply a potent tobacco with high nicotine levels. We have recently assayed two tobaccos reserved for Huichol special occasions in San Andres Coamiata (Jalisco) as *N. rustica* with $18.76\% \pm 2.6\%$ and $12.71\% \pm 1.76\%$ nicotine. These concentrations are perhaps the highest nicotine levels recorded and represent doses which could produce hallucinations and catatonia. Thus, it is possible that other *yauhtli* plants existed but have become linguistically grouped as one.

It may be speculated that yet another set of circumstances led to the use of the *N. rustica*/*T. lucida* mixture. Just as the yellow flowers of *N. rustica* caused early botanists to confuse tobacco with yellow-flowered henbane, so the yellow flowers of *T. lucida* or *N. rustica* may have prompted early Huichol man, who was perhaps already using one of them to experiment with the other. Such notions attempting to account for the origins of this Huichol smoking mixture, are, of course, highly speculative. The maintenance of the practice through reinforcement by a less harsh and more pleasant-smelling smoke than tobacco alone seems more certain.

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Aphrodisiac Use in Pre-Columbian Aztec and Inca Cultures

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APHRODISIACS HAVE BEEN utilized in most cultures, often fairly extensively. For those older cultures where sexuality was a taboo subject, little evidence remains about such related matters as sex-enhancing drugs, irrespective of the extent of their adoption. Even within cultures where sexual taboos were less pronounced, surviving records make it difficult to understand exactly how aphrodisiacs were used. The ancient cultures of the Near East, as well as the Egyptians, the Chinese, the Greeks, the Romans, and the Arabs illustrate this point, for all made use of a considerable quantity of sexual stimulants, but in ways that are not always clear.¹

Like the aforementioned peoples, pre-Columbians used aphrodisiacs, as well as a number of anaphrodisiacs, to modulate sexuality. If they could not gain the love or affection of another in ordinary ways or by magic, they secretly applied aphrodisiac plant or animal substances to change the mind of the desired person. Modern knowledge of these practices within the ancient cultures of the Americas relies heavily on the writings of sixteenth-century Spanish chroniclers, who sometimes provided very detailed accounts. Although most of these chroniclers were Roman Catholics whose ideas about sexuality and morality influenced their observations of indigenous behavior, they recorded enough information to convey some clear concepts about sexual practices, including the adoption of aphrodisiacs. This essay compiles discussions from these early Spanish sources in order to provide a starting point for further research about the role of aphrodisiacs in pre-Columbian cultures of the Western Hemisphere.

The following pages will consider the aphrodisiacs of botanical and animal origin, focusing especially upon their use among the Aztecs and the Incas, because most of the sources deal with these cultures. This is not as

¹P. V. Taberner, *Aphrodisiacs: The Science and the Myth* (London, 1985), 25–40.

restrictive as it might seem, for both peoples incorporated the knowledge and achievements of previous or coexisting cultures into their own. Consequently, the adoption of aphrodisiacs by the Aztecs and Incas may to a large degree be representative of practices in other pre-Columbian cultures.

With regard to sexual morality, the Aztecs and the Incas resembled one another in many ways. Procreation was central to both cultures; having children added to an individual's importance and esteem in society. The promotion of large families was not uncommon in cultures where many soldiers were required for war, and where successful competition depended on population size. Childlessness was a disaster for a married couple. Both cultures prosecuted people who committed adultery (although this was differentiated from concubinage and sex before marriage—see below) or indulged in sexual aberrations; overt homosexuality and wearing the clothes of the opposite sex were punishable by death. Prostitution was frowned upon (although permitted), and prostitutes and their clients were despised. Sex before marriage was permitted, and when a male could afford to support an additional household, he could take a concubine, although here some rules had to be followed.

In some respects the Aztecs and Incas might seem to have been chaste societies, but their mythology suggests another reality. They were very religious peoples who venerated a number of gods, including some associated with sexuality. Among the many deities revered by the Aztecs was Xochiquetzal, goddess of flowers and of love. According to an Aztec myth, she lived in a paradise as wife of one of the most important gods. In that paradise grew a tree called *xochitlicacan*, the fruits of which possessed aphrodisiac properties. After Xochiquetzal ate this fruit, she was easily seduced. In consequence, she was expelled from paradise, while at the same time the tree withered and broke in two.² In addition to Xochiquetzal, the Aztecs worshipped a goddess of sexual affairs and lust, Tlazolteotl. This goddess was primarily associated with sexual desires and was believed to provoke lasciviousness and promote sexual indulgences. When people had committed such sins, the goddess possessed the power to forgive them if they confessed to the priests. But if these sins were not confessed, the goddess chastised sinners by inflicting them with diseases of the sex organs. She was sometimes considered a combination of four goddesses and known under different names, associated with sexual appetites. One of her names, Tlaelqani, means 'eater of dirty things'. The Incas did not have such a goddess, but the pre-Inca Huarochiri culture believed in a goddess of sensuality, called Chaupi Amka, about whom little is known.

²B. C. Brundage, *The Fifth Sun: Aztec Gods, Aztec World* (Austin, 1979), 77–78; Diego Camargo Muñoz, *Historia de Tlaxcala* (Mexico City, 1978), 155.

The indigenous languages of America contain some words associated with aphrodisiacs. In the Aztec language, Nahuatl, the word *tetlacuiti* means ‘something that makes lascivious’. In Peru the word *muxallu* has been translated as ‘something for the virile member’. *Lava-lava* is the Aymara name for a bird with aphrodisiac properties; among other things, the word *lava* means ‘penis’, while *lavayi* refers to an erection.

AZTEC APHRODISIACS

Spanish writers from the time of the Conquest have provided more information about the Aztecs than about the other pre-Columbian cultures. For a general overview, the work of Bernardino de Sahagún is of outstanding importance; he gathered his information directly from Aztec informants. For a description of plants, animals, and minerals, the work of Hernández is particularly significant and detailed. His volume discusses about fifteen hundred plants with medicinal properties, some of them aphrodisiac. Hernández, too, compiled his information from indigenous physicians, but in contrast with Sahagún’s work, his account reflects his European values quite extensively. With regard to aphrodisiac plants, he rarely said more about a species than that it “excites the venereal appetite,” and quite often that attribute was only one of the plant’s potential applications.

The Aztecs knew many aphrodisiacs of botanical origin and some of animal origin. All the Aztec aphrodisiac plants known to these sources are given in table 1, with their references. In a few cases, the exclusive use or principal property of the plant was to whet the sexual appetite. Aztecs customarily called a plant after its principal property, and different plants could have the same name when they had the same application. That is the reason that two different plants share the name *tlaquanuhuilizpatli*, translated by Hernández as ‘medicine for exciting venereal appetite’. The naming of a plant after its application provides a useful index to its major use. There is another interesting aspect in naming patterns: the addition of *patli* means ‘medicine’. Apparently the Aztecs saw these sexual stimulants as beneficial to health.

Atextli was a kind of chocolate beverage, reported by Hernández to be an aphrodisiac. The Aztecs consumed a number of different chocolate beverages, but only *atextli* was described as having aphrodisiac qualities. It is therefore unlikely that the aphrodisiac action was due to the cacao (or *cacahoatl*); more probably it was the result of an additional plant that was blended into this drink. The origins of its stimulating qualities remain unclear. The *atextli* was made of cacao and maize to which were added *mecaxochitl*, *xochinacaztli* and *tlilxochitl* (*Vanilla planifolia*). None of the latter plants, however, was credited with being an aphrodisiac.

Besides the cacao-*cacahoatl*, another plant which became popular among Europeans was associated with sexually stimulating characteristics: the

peanut. It is ironic (and confusing) that the general name for peanut was the same as that for one of the cacao species, *tlalcacáhoatl*, whose name literally means ‘small *cacahoatl*’. The Aztecs identified a vast number of peanut types, but Spanish chronicles mentioned aphrodisiac properties for only one kind of *tlalcacáhoatl*. Observers reported that excessive use of *tlalcacáhoatl* was undesirable; it caused headaches.

The *holquáhuitl* was a tree that produced a resin called *holli* or *hule*. One of its major uses was to provide rubber balls for the Aztecs’ ritual ball game, but it had a number of other applications as well. It was a highly prized medicine, and it was an aphrodisiac.

Many of the aphrodisiac plants were administered orally, mostly in a drink, to obtain the desired effect. Hernández reported that the *cutiriqui*

TABLE 1. Aztec Aphrodisiacs of Botanical Origin

Aztec Name	Description ¹	Reference ²
Ahoacaquáhuitl	<i>Persea americana</i>	H.1.ciii
Apoyomatli	<i>Cyperus articulatus</i>	H.3.xcvi
Atextli	Cacao beverage	H.6.lxxxvii
Atonahuizpatli ³		H.3.cxcii
Cempoalóchitl	<i>Tagetes erecta</i>	H.4.clxxix
Cempoalpatli		H.7.civ
Chiantzotzolto ⁴		H.2.lxiv
Chichicahozton ⁵		H.3.1
Chilli	<i>Capsicum annum</i>	Acosta,H.3.cliii
Cozolmécatl ⁶	<i>Smilax</i> sp.	H.5.lxxii
Cutiriqui ⁷		H.6.xxxii
Holquáhuitl	<i>Castilla elastica</i>	H.9.lvii
Matlalitztic	<i>Commelina coelestis</i>	H.10.cx
Ololiuhqui	<i>Rivea corymbosa</i>	H.12.i
Tencacálotl		H.18.ci
Teonanácatl	<i>Psilocybe</i> sp.	S.11.vii
Tlaelpatli ⁸		H.19.xl
Tlaquauhtilizpatli ⁹		H.19.xxix
Tlalcacáhoatl		H.6.lxxxix
Tlalpayatzin		H.17.xxxiii
Tlatonilatolli	Maize beverage	H.6.xliv
Xocoxóchitl		H.20.xi
Yauhtli	<i>Tagetes lucida</i>	H.7.civ

¹The botanical identification is usually taken from Martínez, 1979.

²H = Hernández.book.chapter; S = Sahagún.book.chapter.

³Also known as *oquechpatli*.

⁴Also known as *tecamaclactlarzin*, *mecapatli*, *quauhtilizpatli*.

⁵Also known as *chichicahoztic*, *cobayelli*, *tlilpoton*.

⁶Also known as *olcacatzin*.

⁷Also known as *tlaquauhtilizpatli*. The plant differs from that mentioned below with the same name.

⁸Translated by Hernández as “venereal medicine.”

⁹Besides maize, unnamed spices were added.

was ingested as an aphrodisiac, and that it had the additional benefits of eliminating envy and reestablishing love in a married couple. The *tlalpayatzin*, however, was applied differently: the loins were flogged with this plant. One of the *tlaquauhilizpatli* species was either taken orally or applied externally on the sexual organ.

A number of the aphrodisiacs given in table 1 possessed psychoactive properties which were particularly important for the Aztecs. The *yauhtli* was reported to have these effects, and the morning glory *ololiuhqui* and the mushrooms *teonanácatl* were widely used hallucinogens. Some hallucinogens described in colonial times as aphrodisiacs were probably of pre-Columbian origin. Among these were *toloatzin* (*Datura* sp.),³ *poyomatli*,⁴ the cactus *peyotl*,⁵ *tecomaxochitl*,⁶ and *colorines* (*Erythrina* spp.).⁷ The *teonanácatl* was used by a few groups among the Aztecs, including prostitutes, although it is not known whether these mushrooms were eaten by prostitutes or their clients, or whether for their hallucinogenic effects or to enhance the libido. Prostitutes also used the *poyomatli* herb, perhaps as a perfume (the *poyomatli* was an odorous plant) or perhaps for its aphrodisiac properties.⁸

While botanical remedies were more numerous, aphrodisiacs derived from animals and insects were mentioned more frequently by the Spanish writers and might have been more important. According to the descriptions of Francisco Hernández, the aphrodisiacs of animal origin, which are listed in table 2, were more potent than those of botanical origin. Among these aphrodisiacs the *mazacoatl* appears most often.⁹ The *mazacoatl* or deersnake was a large snake that had two protuberances on the head, giving the reptile some resemblance to a deer. These protuberances were thought to be quite effective aphrodisiacs, but also very dangerous. A person who relied upon this remedy could become overstimulated and die. The *Florentine Codex* warned against a tincture based on this substance: "He who drinks too much continually erects his virile member and constantly

³V. A. Reko, *Magische Gifte: Rausch- und Betäubungsmittel der Neuen Welt* (Stuttgart, 1938), 114–15.

⁴G. Aguirre Beltrán, *Medicina y magia. El proceso de aculturación en la estructura colonial* (Mexico, 1987), 302, 318.

⁵Ibid.

⁶R. Heffern, *Secrets of the Mind-altering Plants of Mexico* (New York, 1975), 101.

⁷Reko, 126–39.

⁸*Florentine Codex. General History of the Things of New Spain*, trans. A. J. O. Anderson and C. E. Dibble (Salt Lake City, 1950–1969), Book 10, 55–56.

⁹Francisco Hernández, *Historia natural de Nueva España*. In *Obras completas* (Mexico City, 1959), Tratado 3-XX; Bernardo de Sahagún, *Historia general de las cosas de Nueva España* (Mexico City, 1969); Samuel Champlain, *Narrative of a Voyage to the West Indies and Mexico in the Years 1599–1602* (London, 1859), 33; Bernabe Cobo, *Historia del Nuevo Mundo* (Madrid, 1964), 9-XXXVIII; Juan de Cárdenas, *Problemas y secretos maravillosos de las Indias* (Mexico City, 1980), 69.

TABLE 2. Aztec Aphrodisiacs of Animal Origin

Aztec Name	Description	Reference ¹
Acaltetepon ²	Lizard	H.367
Axólotl	Salamander	H.391
Hoitztlacuatzin	Porcupine	Cobo, 9-LXIII; H.299
Mazacoatl	Horned rattlesnake	Sahagún, 11-V
Temolin	Beetle	H.387
Tlalómitl	Worm	LA.11-65
Tlacuatzin	Opossum	H.299
Tlalmazacóatl ³	Small horned snake	LA.11-61

¹H = Hernández.vol. II page no. LA = López Austin.vol. no.-page no.

²Also known as *temacuillacahuya*.

³Also known as *tzumpilacahuatzli*.

ejects his semen, and dies of lasciviousness.”¹⁰ The *tlalmazacóatl*, also called *tzumpilacahuatzli*, was a smaller snake which emerged in large numbers during the rain. It had a rattle and two protuberances like the *mazacoatl*. The effect of drugs made from both species of snake was quite the same: they stimulated lust but could result in death if the dose were too large.

The *temolin*, a large beetle, possessed a horn-like protuberance which contained a strong aphrodisiac and was very toxic. Bernabe Cobo observed that a number of persons died as a consequence of using remedies made from this beetle.¹¹ Other reports that described the highly stimulating properties of the horns of unnamed beetles probably also referred to the *temolin*.¹² The *temolin* is not identical with the Spanish fly: the latter beetle is differently shaped, has no horn, and the whole body of the insect was (and is) used. Nevertheless, it is quite possible that the active ingredient of Spanish fly—cantharidin—is also the active agent of *temolin*. The *temolin* and Spanish fly are both highly poisonous.

References to other aphrodisiac animals appear less frequently in the accounts. The quills of the *hoitztlacuatzin* (porcupine) were pulverized, and the resulting product was used as an aphrodisiac and as a medicine against a variety of ailments.¹³ According to Hernández, the flesh of the back of the *acaltetepon*, a lizard with a terrifying appearance, could have an extraordinarily strong aphrodisiac effect; he compared its flesh with that of the crocodile.¹⁴ Sahagún's informants mentioned the *tlalómitl* for its ability to cause an erection.¹⁵

¹⁰ *Florentine Codex*, book 6, XXII.

¹¹ Cobo, 9-XIX.

¹² *Relaciones geográficas del siglo XVI: Guatemala*, ed. René Acuña (Mexico City, 1982), 265.

¹³ Cobo, 9-LXIII; Hernández, Tratado primero, VI.

¹⁴ Hernández, Tratado tercero, I.

¹⁵ A. López Austin, “Descripción de medicinas en textos dispersos del Libro XI de los Códices matritense y florentino,” *Estudios de cultura nahuatl* 11 (1974), 65.

TABLE 3. Inca Aphrodisiacs

Inca name	Description	Reference
Chichi	Insect larva	Cobo, 7-VIII
Chutarpo	Plant	SPY, 289 ¹
Cuchuchu	Plant: <i>Baccharis</i> sp.	Cobo, 4-XXI
Musullu ²	Small worm	Cobo, 9-XXII
Pencácuc	Plant	Cobo, 4-LVIII
Siaya	Plant	Losa, 109
Tocoracas	Plant: <i>Oxalis crenata</i>	Losa, 201
Uchu	Plant: <i>Capsicum annuum</i>	Acosta, 114
(?)	Porcupine	Cobo, 9-LXIII
Yanta-yanta ³	Bird	Calancha, 144
Ysaño ⁴	Plant: <i>Tropaeolum tuberosum</i>	Losa, 133
Ytapallo	Plant: <i>Urtica</i> spp.	Losa, 133

¹SPY = Santa Cruz Pachacuti Yamqui.

²Also known as *muxallu*.

³Also known as *lava-lava*.

⁴Also known as *isaña* or *aña* and described by others (Cobo, 47; Garcilaso, 48) as an aphrodisiac.

The Aztecs believed firmly in magic and employed it to excite the love of another who was unwilling to respond to the usual gestures. To induce feelings of love, medical incantations were spoken, and in some cases the goddess Xochiquetzal was invoked.¹⁶ While it is not known whether aphrodisiacs were involved in these magic acts, drug use has been reported to have accompanied the incantation in other medical situations.

INCA APHRODISIACS

The list of plants described as aphrodisiacs is much smaller for Peru than for Mexico. This evidence does not necessarily mean that the Incas utilized fewer aphrodisiacs, because the descriptions of plants with medicinal and other properties are much less complete for their region than for the Aztecs. Table 3 summarizes the products of botanical and animal origin for which the Spanish reported aphrodisiac use in Peru.

The Peruvian *uchu* and the Mexican *chilli* were different names for the same plant, which was believed to possess aphrodisiac properties. Since this pepper was used frequently to flavor food, its use was widespread. José de Acosta warned about the excessive use of the *uchu* (or *ají* as he called it, employing the name for pepper used on Hispaniola), which was

¹⁶ Hernando Ruiz de Alarcón, *Tratado de las supersticiones y costumbres gentílicas que aún se encuentran entre los indios de la Nueva España*, and Jacinto de la Serna, *Manual de Ministros de Indios para el conocimiento de sus idolatrías, y extirpación de ellas*, both in *Tratado de las idolatrías, supersticiones, dioses, ritos, hechicerías y otras costumbres gentílicas de las razas aborígenes de México* (Mexico City, 1953), 109, 269.

especially popular among young men. He considered it damaging to health, especially spiritual health, because of its effect on sexual desire.¹⁷

Cobo described the aphrodisiac properties of the plant *pencácuc*, which existed in a male and a female form. He stated that the roots of the male and female forms of the plant had opposite effects: "The male plant . . . has another strange property. When its root is eaten it incites an extremely strong lust feeling. The remedy to appease this fire of lust is to eat the root of the female plant; its action is immediate. This peculiar effect is well known to the Indians, especially in the province of Chachapoyas, where much of this herb grows."¹⁸

Observers described a similar relationship between the male and female forms of a plant called *chutarpo* (or *huanarpo*). The male form, *chutarpo*, was known to act as an aphrodisiac; the female form, *huanarpo*, acted in the reverse way and could be used as an anaphrodisiac.¹⁹ Given the resemblance between biochemical pathways in the male and female forms of the same species, there is a strong chance that these effects were at least partly psychological.

In addition to the plants given in table 3, a colonial source mentioned some plants, such as the *olluco*, the *paltas*, and the *tocoracas*, which "caused an increase of sperm" and thus acted as a kind of aphrodisiac.²⁰ In later sources the fruit of the plant *algarroba* was noted as a widely known aphrodisiac.²¹ The Spanish name *algarroba* denotes a number of plants, among which is a *Mimosa* species.²² It might be that the indigenous name *pencácuc* is identical with this *algarroba*, though it is not certain. There are some plants which were used by the Peruvian Indians as aphrodisiacs in later times about which no information is available for Inca times. But it seems likely that their later use is a survival from an earlier period. In Peru the *chamico* (*Datura stramonium*) is believed to possess aphrodisiac properties; in the early nineteenth century the inhabitants of the Andean highlands used a beverage containing *chicha* (a light alcoholic drink) and *chamico* as an aphrodisiac for women.²³

¹⁷ José de Acosta, *Historia natural y moral de las Indias* (Madrid, 1954), 4-XX.

¹⁸ Cobo, 4-LVIII.

¹⁹ Juan de Santa Cruz Pachacuti Yamqui, *Antigüedades deste reyno del Perú* (Madrid, 1968), 289.

²⁰ Gregorio de Losa Avila y Palomares, *De los árboles; frutos; plantas; aves y de otras cosas medicinales ... tiene este reyno* (La Paz, 1983), 90, 93, 117.

²¹ W. Golden Mortimer, *History of Coca* (San Francisco, 1974), 210.

²² J. Soukup, *Vocabulario de los nombres vulgares de la flora Peruana* (Lima, 1970).

²³ F. Cabiceses, *Apuntes de medicina tradicional. La racionalización de lo irracional* (Lima, 1933), 509; J. M. Cooper, *Stimulants and Narcotics*, vol. 5 of *Handbook of South American Indians* (Washington, 1949), 555.

The *yanta-yanta* bird was considered to be a highly effective sexual stimulant, but most of the evidence relates only to a side-effect: it was highly toxic. For that reason it was used to cause a painful and slow death.²⁴ The *musullu* was a small worm that lived in only two types of trees: the *molle* or the *tipa*. The worm, which was probably a butterfly larva, possessed highly caustic properties, and was used for that reason against fleshy growths (i.e., to burn off warts or tumors). That it could cause blisters did not prevent the Indians from applying it to the virile member to produce an erection.²⁵

The *chiche* or *chichi* was an insect larva used by the Indians not only to induce feelings of lust but also as a diuretic.²⁶ In addition, the *chichi* was very popular among the Incas as the base of an appetizing condiment. The chronicler Martín de Morua recorded that several types of worms were used to increase the potency of the male,²⁷ and it seems likely that the *musullu* and the *chichi* were among them. The porcupine provided another sexual stimulant; the powdered quills, taken orally in water, were believed to be efficacious, according to Cobo.²⁸

Although there is evidence that Incas sometimes resorted to the use of aphrodisiacs to win a reluctant lover, in the Inca culture reliance upon drugs was secondary to reliance upon the supernatural. When all ordinary methods failed to gain the affection of the desired person, the love-lorn individual might consult a special class of sorcerer.²⁹ The sorcerers created powerful objects, called *huacanquis*, to be carried; the objects were believed to attract women or men, according to individual wishes.³⁰ According to Brundage, a *huacanqui* can be seen as a *huaca* (an object with supernatural power), a *huaca* of desire. The *huacanquis* could be made of birds' feathers or other materials. Cobo mentioned in one place that the *huacanquis* were magic objects made from feathers, but in another he described a *huacanqui* as an insect used for the same purpose. Morua also mentioned a *huacanqui*, describing it vaguely as a type of worm.³¹ Possibly the insect and the worm were aphrodisiacs, intended to reinforce the magic act; the underlying idea was that someone with an urgent sex drive was particularly well prepared to enter into a relationship, compared to someone who lacked such desires.

²⁴ Antonio de la Calancha, *Corónica moralizada del orden de San Agustín en el Perú* (Lima, 1974), 144.

²⁵ Cobo, 9-XXII.

²⁶ Cobo, 7-VIII.

²⁷ Martín de Morua, *Los orígenes de los Incas* (Lima, 1946), 159.

²⁸ Cobo, 9-LXIII.

²⁹ Cobo, 13-XXXVI; Felipe Guaman Poma de Ayala, *El Primer nueva corónica y buen gobierno*, ed. J. V. Murra and R. Adorno (Mexico City, 1980), 274.

³⁰ Cobo, 13-XXXVI; Juan Polo de Ondegardo, *Informaciones acerca de la religión y gobierno de los Incas* (Lima, 1916), 196.

³¹ Brundage, 189; Cobo, 9-IV; Morua, 159.

ANAPHRODISIACS

In addition to aphrodisiacs, pre-Columbians knew of some anaphrodisiacs. In Mexico the *huexólotl* could be utilized in malevolent practices. The crest of the male bird, which was supposed to be an anaphrodisiac, would cause its victim to be unable to produce an erection.³² About the *acueyo* Hernández said only that it inhibited venereal appetite.³³ Sahagún's informants mentioned that the flesh of the ocelot had anaphrodisiac properties, being quite useful to help widowers forget their wives.³⁴

The Inca rulers fed *añu* (*Tropaeolum tuberosum*), also called *isaña*, to soldiers who were engaged in warfare to help them forget their wives and thus improve their fighting spirit.³⁵ Garcilaso reported that the anaphrodisiac action of the plant was well known to the Indians.³⁶ Some of those who prided themselves on their sexual prowess used to eat the root while holding a little stick in one hand, apparently to challenge the root's power. The *piliyuio* was a plant with a number of medicinal applications; it was used against gout, stomach complaints, urinary troubles, ailments of the liver, and it was a powerful purgative. But its effectiveness as a remedy had a disadvantage: even small amounts of an infusion of the seeds would extinguish all sexual fire.³⁷ Another name for the *piliyuio* was *siquis* or (in Aymara) *chamcoroma*.

APHRODISIACS AND ANAPHRODISIACS IN CRIMINAL PRACTICES

Many chroniclers have described the criminal use of plant and animal products by the Aztecs as well as the Incas.³⁸ The secret administration of fatal substances made it possible to escape the severe punishments which both cultures meted out to murderers. Slow-acting products were popular poisons because the culprit could not be easily traced. Aphrodisiacs were among the products described as poisons for criminal practices. Those aphrodisiacs which gave a long-lasting overstimulation, such as the *mazacoatl*, were especially popular. In these cases death was typically not instantaneous, which allowed the offender a chance to gloat over his victim.

³² Sahagún, 11-II.

³³ Hernández, 3-XLI.

³⁴ López Austin, 213.

³⁵ Cobo, 4-XVIII.

³⁶ El Inca Garcilaso de la Vega, *Royal Commentaries of the Incas and General History of Peru* (Austin, 1966), 501.

³⁷ Losa, 99.

³⁸ J. G. R. Elferink, J. A. Flores, and C. D. Kaplan, "The Use of Plants and Other Natural Products for Malevolent Practices among the Aztecs and their Successors," *Estudios de cultura nahuatl* 24 (1994), 27-47.

In Mexico, as mentioned above, the *huexólotl* was used in criminal practices, to render a victim impotent.³⁹ Aztec prostitutes used aphrodisiacs to drum up business, with potentially hazardous consequences. Sahagún provided a vivid description of this application when he recorded the advice of an upper-class father to his son who was going to be married. The father warned his son against all types of persons who might cause harm:

[E]special[ly] the bad women . . . [who] often add substances to the meal or in a drink to provoke lasciviousness, and these substances not only harm the body and the spirit, but they also kill . . . the person who eats and drinks. . . . Those who take the flesh of the mazacoatl, which is a snake with horns, can copulate with four or five or even more women, and several times with each of them. The persons who do so will die. [B]e careful, my boy, if someone you do not trust gives you something to eat or drink, be suspicious and do not eat or drink before the one who gave it to you has taken from it.⁴⁰

The Incas used several plants and animals as aphrodisiacs or as anaphrodisiacs that could be applied in malevolent practices. In Peru the flesh of the *yanta-yanta* bird was considered as a highly effective sexual stimulant. But its use was not without danger, and for that reason it was disguised in food or drink and given secretly to one's enemies. As a consequence, they died slowly.⁴¹

Evidence indicates that both the Aztecs and the Incas made significant use of aphrodisiacs. The Spanish observers sometimes expressed disdain for those who used them to stimulate lustful feelings; however, they described them openly and without reservations. This attitude is reflected in the work of Farfán, a chronicler who described Mexican medicine but wrote mostly for the Spaniards.⁴² He discussed male impotence and its treatment without hesitation, concerned only with treating the ailment in the most effective way. Because the Spanish chroniclers were able to gather information about many plants and animals that were used as aphrodisiacs, presumably the same openness was present among the pre-Columbian Indians.

To gauge the effectiveness of the pre-Columbian aphrodisiacs, we must rely on the reports of Spanish observers since no modern investigations have been carried out. In nearly all reports of aphrodisiac use,

³⁹ Sahagún, 11-II.

⁴⁰ Ibid., 6-XXII.

⁴¹ Calancha, 144.

⁴² Agustín Farfán, *Tractado breve de medicina* (Madrid, 1944), 231-34.

the chronicler cites the indigenous population as the source.⁴³ The fact that indigenous people supplied such information does not necessarily warrant its accuracy. Little information is given about the potency of some aphrodisiacs, and the descriptions of others suggest they acted in a largely magical way. But it cannot be denied that some aphrodisiacs had the desired effect; for example, some of those that were used in criminal practices are known to cause death from overstimulation.

Other plants available to pre-Columbian cultures have been held at various times to be aphrodisiacs. Among these are the tomato, the potato, tobacco, and coca. Tobacco was used in pre-Columbian Central America for its psychoactive properties, and coca was used by Inca nobles before the Conquest and by all Incas after the Conquest for a variety of medicinal purposes.⁴⁴ But neither the Aztecs nor the Incas attributed aphrodisiac properties to any of these, and Europeans ceased to do so once they were in common use.⁴⁵

⁴³ One exception to this is the bezoar stone, which was described by Hernández (Tratado primero, XXII) as an aphrodisiac without reference to indigenous information. Given the stone's popularity as a cure-all in Europe, his statements are probably more indicative of its use in Europe than in the Americas.

⁴⁴ J. G. R. Elferink, "The Narcotic and Hallucinogenic Use of Tobacco in Pre-Columbian Central America," *Journal of Ethnopharmacology* 7 (1983), 111–22; R. T. Martin, "The Role of Coca in the History, Religion, and Medicine of South American Indians," *Economic Botany* 24 (1970), 422–37.

⁴⁵ Several psychoactive substances have been reported as having aphrodisiac properties. Among these ethanol is the best known, but also included are cannabis, cocaine, opium, nicotine, LSD, and MDA (3, 4-methylenedioxymphetamine). (See Taberner, 173–214.) While the direct aphrodisiac effect of some of these substances is highly questionable, their ability to reduce sexual constraints might have an indirect effect.



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The Role of Coca in the History, Religion, and Medicine of South American Indians

RICHARD T. MARTIN¹

Of all the plants which modern science has adopted from the *materia medica* of South American Indians, the coca shrub, *Erythroxylum coca* Lamarck of the Erythroxylaceae, is perhaps the most famous. Coca leaves have been widely used in South America as a masticatory and medicine for over two thousand years. The plant is extensively cultivated in eastern Peru and Bolivia between 1,500 and 6,000 meters in the warm, moist valleys of the montaña. On a smaller scale, the plant has been cultivated also in northern Chile, Ecuador, southern Colombia and the Sierra Nevada de Santa Marta, and throughout the Amazon Basin, as well as in many countries in the Old World. Although no examples of truly wild coca are known, the presence of several similar wild species in the montaña region of Peru and Bolivia suggest this as the probable area of origin of the cultivated species. Many distinct varieties of coca are found under cultivation, several frequently occurring in the same plantation. Botanists often regarded certain of these varieties as distinct species i.e. *E. novogranatense* (Morris) Hieronymus, *E. truxillense* Rusby, and *E. bolivianum* Burck. Since, however, the plant shows great plasticity under different ecological conditions and virtually nothing is known of the genetics of the plant, it seems best to regard these as cultivated varieties rather than distinct species, until cytological research and hybridization experiments can determine the significance of the variation.

The coca plant is a shrub of approximately one meter in height with a number of striking botanical characteristics. The leaves have very distinctive longitudinal areolate lines curving toward the midrib which are merely

thickenings in the epidermal cells resulting from the manner of unfolding of the leaf. At the base of the petiole there are characteristic ovate intrapetiolar stipules. The creamy white flowers are about one centimeter long with five sepals and five petals. Each petal has a distinctive clawed appendage on its inner surface; in the intact flower these unite to form a crown. The 10 slender stamens are basally united into a short membranaceous cupule with short denticulations outside and between the filaments at the rim. The pistil possesses a three-locular superior ovary with a single ovule suspended from each locule. The plant is heterostylous, i.e. the three yellowish green styles may be either shorter or longer than the stamens. In the ripening of the fruit, two of the ovules abort, and the locules are obliterated. The fruit is an ovate red drupe with one seed.

The remarkable physiological activity of coca is due primarily to its alkaloids: to date, some 14 alkaloids have been isolated from varieties of the coca plant. The alkaloids belong to the tropane series, together with atropine and scopolamine from the Solanaceous genera *Datura*, *Hyoscyamus*, *Atropa*, etc. The coca alkaloids are a mixture of ecgonines, tropeines and hygrines. The ecgonine derivatives include cocaine (methyl benzoyl ecgonine), methyl ecgonine and cinnamyl cocaine; the tropeines include tropeine and pseudotropine, dihydroxytropeine, tropacocaine and benzoyl tropane; the hygrines include hygrine, hygroline and cuscohygrine. The stereoisomers α - and β -truxilline have also been isolated from coca leaves, and nicotine has been reported.

The isolation of cocaine from coca leaves by Niemann of Göttingen in 1860 and the discovery of its application in local anaesthesia by Dr. Carl Koller in 1884 constituted major advances in the science of pharmacology, and gave the coca plant and its derivatives an important place in the development of modern medicine. However, the dis-

¹ Botanical Museum of Harvard University, Cambridge, Massachusetts. Submitted for publication June 11, 1970. A paper read before the XI International Botanical Congress, Seattle, Washington, August 1969.



FIG. 1. Koreguaje boy with coca shrub. (Upper Río Caquetá, Colombia. Photograph by R. E. Schultes.)

covery of cocaine had another less beneficial effect on the reputation of the coca plant; for the occasional abuse of this alkaloid, particularly among persons already addicted to opiates, which was sensationalized by the press both in Europe and the United States at the end of the 19th Century, created the erroneous fear that coca equalled opium in its perniciousness and its deleterious effect on physical and mental health. In the space of 20 or 30 years, coca went from high praise by kings, popes, artists and doctors as the most beneficial stimulant tonic known to man to vigorous condemnation as a dangerous addictive narcotic. The effect of this prejudice and the subsequent legal ban on coca leaves in Europe and the United States was to halt ex-

perimentation with and use of coca leaves by doctors; only specialized uses of cocaine in anaesthesia were regarded as acceptable. Even more serious, however, is the fact that confusion about the effects of crude coca leaves and those of cocaine has caused many people to regard the chewing of coca leaves as practiced by the Indians of South America as merely an addictive vice, with the lamentable result that coca is now being suppressed even in areas where the Indians have relied on its stimulating and medicinal properties for thousands of years, and where it has formed a significant part of their religious and cultural heritage.

My purpose here is to review briefly the importance of coca leaves in the lives of South American Indians with particular em-



FIG. 2. Fruits and buds of *Erythroxylum coca* Lam. (Photograph by T. Plowman.)

phasis on its role in indigenous medicine and religion. Only appreciating the use of coca from the point of view of the Indians' cultural heritage, their beliefs, and the necessities of their daily lives can give a proper perspective on the meaning of coca to these people. In examining the literature on coca, one notices the fact that those authors—scientists and laymen alike—who have spent time living, working and making friends with the Indians have been the most ready to emphasize coca's beneficial effects and lack of serious deleterious effects, which in many cases they corroborated by personal experiences with the drug; on the other hand, the most derogatory and condemning reports have come from travellers like Pöppig, who admitted his distaste for Indian customs, or from officials and doctors who have had little if any experience with Indian life.

Perhaps the most ancient use of coca in South America is its employment in various shamanistic practices and religious rituals. As is the case with tobacco, the Indian medicine man valued coca specifically for

its narcotic effects; the mild mental excitation which follows the mastication of the leaves enabled him to enter more easily into a trance state in which he could communicate with the spiritual forces of nature and summon them to his aid. The Indians' spiritual practices of fasting, meditation, incantations and dancing appear to be in every way analagous to similar shamanistic and religious practices found in the Old World.

This power of coca to enhance the effectiveness of meditation and incantations and to produce trance states is responsible more than any other factor for its reputation as a divine plant. The religious importance of coca is seen even in the earliest evidences for its use. Mochican pottery from the Classic Epoch of the northern coast of Peru (around 500 AD) contains numerous examples of painted scenes of coca chewers and molded vessels showing the characteristic distended cheeks of coca chewers which indicates that coca was used by persons of high rank, probably priests. The Incas regarded coca as the most sacred of plants, as a "living manifestation of divinity, and the



FIG. 3. Nasca jar depicting wounded warrior with an *acullico* in the left side of the mouth. (From Yacovleff and Herrera, "El Mundo Vegetal de los Antiguos Peruanos," p. 298).

place of its growth a sanctuary where all mortals should bend the knee."² Garcilasso Inca de la Vega, an early chronicler of mixed Spanish and Incan ancestry, recounts the legend that the children of the Sun presented the Incas with the coca leaf to satisfy the hungry, provide the weary and fainting with new vigour and to cause the unhappy to forget their miseries. Under the Inca

Empire, the use of coca was restricted largely to the nobility and priests; a gift of coca was considered one of the highest marks of imperial favor. At the *huaraca*, or initiation ceremony for young Inca nobles, the young men competed in foot races, while young maidens stood along the course offering coca and chicha and crying, "come quickly youths, for we are waiting."³ At the

² Unanue, 1794.

³ Mortimer, p. 70.

end, each youth was invested with a *huaraca* or sling and the *chuspa* filled with coca leaves to symbolize his new manhood. Coca was also presented to the nobles of newly conquered tribes when they were assimilated into the empire. All of the records, traditions and history of the Inca empire were handed down by court orators or *yaravecs*, individuals with phenomenal memories who related the history of the race in detail at royal councils, aided only by a system of knotted strings, the *quipu*. The *yaravecs* were permitted the use of coca to strengthen their capacity for recollection; this tradition stands in contrast to some modern authors who have claimed that coca retards the memory and dulls the intelligence. Special sacrifices of coca were made at Incan ceremonies at the Temple of the Sun in Cuzco, and it was considered essential that supplicants should approach the altar only when they had coca in their mouths. As the most important vegetal offering, coca was sacrificed at virtually all religious festivals, the leaves being thrown to the four cardinal points or burnt upon the altars. Coca was also frequently used for purposes of divination; the Incas believed in consulting supernatural powers before undertaking any important action. Frequently diviners would chew coca leaves and spit the juice into their palms with the two longest fingers extended: if the juice ran down both fingers equally the augury was good; if unequally, it was bad. Other diviners would burn coca leaves with llama fat and watch the way in which they burned.

Following the destruction of the Inca empire by the Spaniards, the use of coca became much more general among the masses; nonetheless, it retained its place as the divine plant and has been used by the Quechua Indians in all offerings and religious rites up to the present time. When a pack train is ready to depart, the Indians throw coca in the air to propitiate the gods of the mountain and ensure a safe trip. Piles of sacred stones, originally dedicated to *Apachic* or *Pachacamac*, now with rude crosses placed on them by missionaries, are scattered along the paths in dangerous mountain passes; as an offering and to ask for continued strength and endurance, the

Indian will throw his quid of coca against the rocks. Coca is also periodically offered to the earth mother to ensure good crops or before inserting the corner stones of a new house, and a young man frequently takes offerings of coca to a girl's parents to obtain their consent for marriage. In graves where mummies are found, there is always a supply of coca in *chuspas*, and frequently a quid has been placed in the mouth of the deceased to give him strength on his journey. Poeppig relates a common Indian belief that, if a dying man can appreciate the taste of coca leaves pressed to his lips, his soul will enter paradise.

Coca was equally important in the spiritual life and religious rituals of many other groups of Indians, particularly among the Chibcha of Colombia and the Aymara of Bolivia. Among the Chibcha, coca was used by the priests (*cheque*) for divining. After 12 years of training, a *cheque's* ears and nose were pierced and he was invested by the ruler with a pointed mantle and a calabash container for his coca. Among the Aymara, coca is chewed at all ceremonial occasions such as marriages and wakes. When a new headman of an *ayllu* or district is introduced by his predecessor, he takes a drink and a pinch of coca with every household head. The chief method of divination among the Aymara is through the medium of coca. Coca divination is practiced not only by diviners (*yatiri*) but also by black magicians (*laiqa*), white magicians (*paq*) and healers (*qolasiri*).

The most accurate and complete account of the religious uses of coca among modern Indians is Reichel-Dolmatoff's report on the significance of coca among the Kógi, a group of Indians of the Sierra Nevada de Santa Marta which has been sufficiently isolated to retain many tribal traditions. Among the Kógi the use of coca is restricted to the males. After the evening meal, the men either retire to meditate and chew coca or they go to the ceremonial house to chew coca and spend the night dancing, chanting, and having ceremonial conversations with "Los Antiguos." Reichel-Dolmatoff's account gives a clear description of their motives for chewing coca: "Upon the effect of the coca, the Kógi emphasizes in the first place that its consumption brings a certain



FIG. 4. Moche vase showing consumer of coca holding a calabash in one hand and a small stick for extracting the lime in the other. Note the chuspa for carrying coca leaves hanging on the left side. (From Yacovleff and Herrera "El Mundo Vegetal de los Antiguos Peruanos," p. 298.)

mental clarity which one ought to take advantage of for ceremonial gatherings and any religious act in general, being conversations, personal rites, or group rites. Evidently the coca causes a euphoric state which lasts for a long period and is pro-

longed by the gradual consumption of larger and larger quantities. The individual turns into an animated speaker, and says that he feels an agreeable sensation of tingling over all the body and that his memory is considerably refreshed which permits him to

speak, sing, and recite during the following hours. In the second place the Kógi say that coca appeases hunger. According to them, however, this never is the object of consuming coca but only an agreeable consequence, seeing that during the ceremonies or ceremonial conversations the consumption of food is prohibited and the assistants ought to fast. Another effect which is attributed to the coca is insomnia. Here again the Kógi see an advantage since the ceremonial conversations should be carried on at night and individuals who can speak and sing for one or several nights without sleep, merit high prestige. The Kógi ideal would be to never eat anything beside coca, to abstain totally from sex, to never sleep, and to speak all of his life of the "Ancients," that is to say, to sing, to dance and to recite."⁴

The utilization of coca leaves by Indian laborers and travellers to reduce muscular exhaustion and alleviate hunger and thirst has been widely reported by various authors, and is perhaps the most widely known of the uses of coca. The Incas recognized coca's power to increase endurance, and the *chasquis* or relay messengers and the soldiers were enabled to endure incredibly long marches at high speed by chewing coca. The Spaniards were likewise quick to recognize this capacity of the drug since it enabled the Indians to perform more work with less food; unfortunately, the mine and plantation owners too frequently abused this property of coca and forced the Indians to work unbelievably long hours—up to forty-eight hours at a time—without adequate nourishment or rest. The Indians of the Peruvian Sierra are famous for their ability to travel rapidly along mountain paths with heavy burdens, sustained only by an occasional *acullico* or chew of coca. The Sierra Indians are even accustomed to measuring the length of a journey by the hours that one chew of coca will sustain them in their journey—a period of time called the *cocada*. The *cocada* is more a measurement of time than distance; the first influence of the leaves is felt within ten minutes, and the effect lasts about 45 minutes in all, during which time the Indian will cover about three kilometers on level

ground or two kilometers going uphill. Lloyd, in his study on the use of coca by the Momberos of Colombia, describes the incredible endurance of Indian porters near Popayán: "After eating a simple breakfast of ground corn porridge they would start with their heavy packs, weighing from seventy-five to more than one hundred pounds, strapped to their backs. All day long they travelled at a rapid gait, over steep mountain spurs and across mucky swamps, at an altitude that, to us, without any load whatever, was most exhausting. On these trips the Indians neither rested anywhere, nor ate at noon, but incessantly sucked their wads of coca throughout the entire day. These Indians we found very pleasant, always cheerful, happy, and good natured, in spite of the fact that their daily toil subjected them to the severest of hardships and the most frugal fare."⁵ An even more impressive account of endurance sustained by coca is given by von Tschudi: "A Cholo of Huari, named Hatun Huamang, was employed by me in very laborious digging. During the whole time he was in my service, viz. five days and nights, he never tasted any food, and took only two hours sleep nightly. But at intervals of two and a half or three hours, he regularly masticated about one half an ounce of coca leaves, and he kept an *acullico* continually in his mouth. I was constantly beside him, and therefore I had the opportunity of closely observing him. The work for which I engaged him being finished, he accompanied me on a two days journey of twenty-three leagues across the level heights. Though on foot he kept up with the pace of my mule, and halted only for the *chaccar*. On leaving me, he declared that he would willingly engage himself for the same amount of work, and that he would go through it without food if I would but allow him a sufficient supply of coca. The village priest assured me that this man was sixty-two years of age, and that he had never known him to be ill in his life."⁶

Coca is equally important in the daily routine of the Indian farmer. The work day of a Quechua Indian during plowing time begins at dawn, when he meets the members

⁴ Reichel-Dolmatoff, I. pp. 77-78.

⁵ Lloyd, A treatise on Coca, pp. 12-13.

⁶ Von Tschudi, p. 453.



FIG. 5. Kubeo woman preparing powdered coca. (Río Kuduyarí, Vaupés, Colombia. Photograph by R. E. Schultes.)

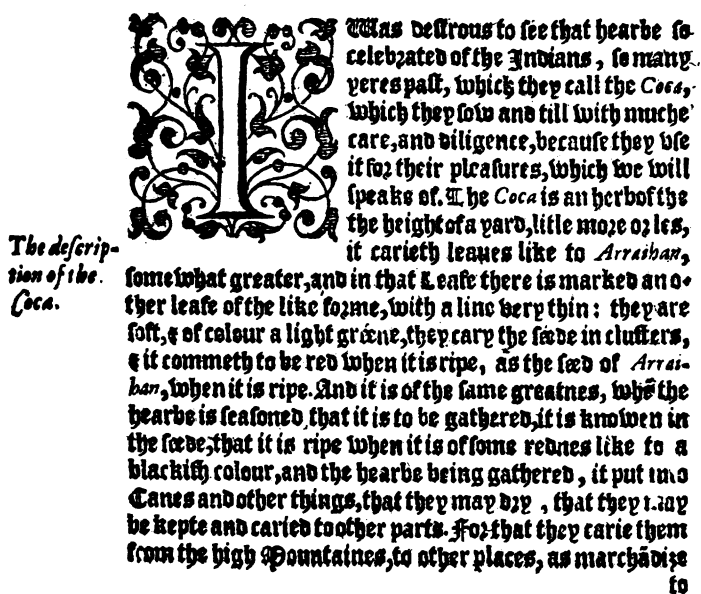
of his work party, and they sit together on the ground chewing coca supplied by the owner of the plot. Work commences soon after, but is interrupted after an hour for another coca chew. At noon, another break is taken for a brief lunch of chuño, potatoes, and sometimes cheese, followed by more coca. After working until two o'clock, the party stops for another chew of coca; the work day ends at five o'clock, when the members of the party return home. In arguing against the suppression of coca in Colombia, Henri Lehmann emphasizes the importance of coca to the Indian farmers, particularly since their fields frequently lie far from their homes, and the Indians eat usually only at dawn and at the end of the work day.

The process of masticating coca, termed *chaccar* or *acullicar* in Peru and Bolivia, is essentially the same now as it was in the time of the Incas. The Indian who is preparing to *acullicar* first relieves himself of his burden and makes himself as comfortable as circumstances permit. He then

reaches into his *chuspa*, or woven sack for carrying coca, and, with great deliberation and evident satisfaction, he withdraws the leaves one by one, sometimes removing the midrib, and places the leaves in his mouth, chewing and turning them until they form a ball or quid (the *acullico*), which is held between the cheek and the gums.

He then inserts a small moistened stick or needle into a small tin container or more frequently a calabash gourd (known as an *ishcupuru* in Peru and a *poporo* in Colombia), which contains an alkaline mixture, variously known as *llipta*, *tocra*, or *mambe*. This alkaline substance varies according to regional availability of materials; it may be composed of quicklime, powdered calcareous shells or ashes obtained by burning the stalks of the quinoa plant (*Chenopodium quinoa* L.), the barks of various trees, a woody cactus, or even *Musa* root—the ashes being made into a paste for use. This alkaline mixture is then carefully introduced into the quid of coca leaves, care being taken not to cauterize the lips and mouth

Of the Coca.



(Figure 6—part 1)

FIG. 6. Early description of the medicinal uses of coca in Monardes' "Joyfull Newes out of the Newe Founde Worlde." (Fol. 102-103, London, 1596.)

and apparently facilitates the release of the desired active principles. The leaves are kept in the mouth with the lime, while the juice trickles into the stomach: in other words, the leaves are never actually chewed. The average coquero will consume between one and two ounces of coca daily in this manner.

The only significant divergence from this method of mastication is found among the tribes of the Amazon Basin. In this region, the coca leaves, known as *ipadú* in Brazil, are roasted on the mandiocca oven and afterwards ground into a fine green powder in a large cylindrical wooden mortar. Often, a small quantity of tapioca is added to give it consistency, and the finely sifted ashes of the *imbaúba* or *yarumo* tree (various species of *Cecropia* and *Pourouma*) are thoroughly mixed with the green powder. An unusual modification of this procedure was observed by Schultes among the Tanimuka of the Igarapé Peritomé on the Río Apaporis in

Colombia. Long slender tubes of the rolled and partly dried leaves of *Ischnosiphon* are tamped half full with small lumps of the whitish resin of *Protium heptaphyllum* March. An Indian then lights the tube and inserts the burning end into the still glowing pile of *Cecropia* ashes; by blowing vigorously on the tube, he causes the balsamic incense to permeate the ashes, imparting a very strong flavor to the ash, which is then mixed with the pulverized coca.

Perhaps the most controversial aspect of the use of coca leaves is the question of its effect on the health of the Indians. The Indians almost universally regard coca as a food, from which they derive actual sustenance. On the other hand, many modern observers have assumed that coca acts merely to anaesthetize the sensory feeling of hunger without aiding nutrition in any way, and some have condemned coca as actually producing malnutrition among the Indians. However, the Indians rarely use

are brought from the West Indias. Fol. 102

to be solde, they barter and change them for Mantelles, and Cattel, and Salt, and other things which runne like monie amongst vs, they plant the seede in *Almaciga*, and from that they take them vp and set them in other places, into Earth that is wel laboured or tilled, and made conuenient to set them in by their lines and order, as we do set here a Garden of Beanes, or of Peason.

The vse of it amongst the Indians is a thing generall, *The vse of it.* for many things, for when they trauell by the way, for needs and so; their content when they are in their houses, they vse it in this sorte. They take Cockles or Wyffers, in theyr Shelles, and burne them and grinde them, and after they are burned they remaine like Lime, very small gronde: then they take the Leaues of the *Coca*, and chewe them in theyr Pouthes, and as they chewe it, they mingle with it some of the powder made of the Shelles in such sorte, that they make it lyke to a Masse, taking lesse of the Powder then of the hearbe, and of this Masse they make certeyne small bawles rounde, and lay them to drye, & whē they will vse them, they take a little Ball in their mouth, and chewe it, rowling it from one place to an other, procuring to conserue it all that they can, and that being done, they take another, and so they goe, vsing it al the time that they haue need, which is when they trauell by the waye, and especially if it bee by wayes where is no meate, nor plentie of water. For the vse of these litle Balles taketh the hunger and thirst from them: & they say that they receiue substance thereby, as though they dyd eate meate. At other times they vse them for their pleasure, although they labour not by the way, and they vse the same *Coca* alone, chewing it & tolling it in their mouths, from one side to another, vntil there be no vertue remaining in it, and then they take another.

When they will make themselves drunke, and be out of iudgement, they mingle with the *Coca* the leaues of the *Tabaco*, *Note.*

C c 2

Tabaco,

(Figure 6—part 2)

The thyrd part of the thinges that

Tabaco, and chewe them altogether, and goe as they were out of their wittes, or as if they were drunke, which is a thing that dooth giue them great contentment, to be in that sort. Surely it is a thing of great consideration, to see howe desirous the Indians are to be depriued of their wittes, and to bee without vnderstanding, seeing that they vse thus the *Coca* with the *Tabaco*, and al to this end, that they would by without vnderstanding, and haue their wittes taken from them, as we sayde in the seconds parte, when we treated of the *Tabaco*.

(Figure 6—part 3)

coca to the exclusion of other food, although they may make use of the ability of coca to allay hunger when food is scarce or unavailable. This is apparent from Weddel's observations in northern Bolivia: "The Indians who accompanied me in my voyages chewed, in effect, the coca during the entire day; but when evening arrived, they replenished their stomachs like starved men, and I can assure that I have seen them often ingest in one meal, as much food as I would consume in two days."⁷ The chemical analysis of coca leaves has shown that they are relatively rich in vitamins, particularly vitamin B₁, riboflavin and vitamin C; in fact, chewing approximately two ounces of coca leaves daily (an average dose) will supply almost a daily vitamin requirement, an important point in view of the great scarcity of fruits and vegetables in the sierra.

Even more important than these considerations, however, is the action of coca in enhancing the assimilation of other foods, by increasing the flow of saliva and gastric secretions and giving strength to the muscles of the gastrointestinal tract. Von Tschudi⁸ comments that the food of the Indians consists almost exclusively of vegetable substances, especially roasted maize and barley converted by crushing, which they consume without admixture of any other substance. The continued use of this farinaceous food, he maintains, causes severe obstructions which the well known aperient qualities of the coca counteract, and many serious diseases may thereby be prevented. Furthermore, throughout South America, an infusion of coca leaves is regarded as the remedy par excellence for indigestion, stomach ache and stomach complaints in general. Even Indians who do not regularly masticate the leaves frequently possess a few plants for this purpose alone. Cobo,⁹ who listed the medicinal uses of coca by indigenous doctors, mentions that the juice of coca comforts the stomach and aids digestion, and that it removes all gas and pains in the side. The decoction of the leaf drunk regularly is reported to be valuable against laxity of the bowels, and the powder of the leaves

mixed with salt and egg white was administered in small quantities to dry out and heal ulcers. The decoction of the seed, drunk with bee honey and *yerba buena*, is mentioned as aiding the relaxation of the stomach and alleviating vomiting.

The coca plant also finds many other uses in alleviating the ills and discomforts of the Indians. Coca has frequently been praised for its beneficial effect on respiration, an important consideration since Peru and Bolivia possess some of the highest inhabited areas of the globe. Dr. Carlos Monge, South America's leading expert on high altitude biology, has noted the direct relation between the frequency of the coca habit and the altitude and emphasizes the important effect that coca has on the physiology of people living at high altitudes. The Indians also administer a coca tea to bring quick relief from the alarming symptoms of nausea, dizziness and severe headache in *soroche*, or mountain sickness, which occasionally results from the low oxygen content of the air and the low atmospheric pressure.

The Indians also consider coca to be effective in preventing infirmities of the teeth and gums. Cobo was among the early chroniclers to draw attention to this application of coca: "Its temperament is hot and dry, with very good stypticity; when chewed regularly, it removes from the teeth all corruption and decay, and makes them white, firm, and strong. It happened to me, that calling one time on a barber to extract a molar, since it pained me very much, the barber said to me that it would be a pity to remove it, since it was good and healthy; and since there was present a religious friend of mine, he counseled me to chew coca for some days. This I did, and with it the toothache left and the tooth remained firm like the rest."¹⁰

Coca was also widely employed to relieve the pains of rheumatism, headache and external sores. Padre Blas Valera reports that "Coca protects the body from many ailments, and our doctors use it in powdered form to reduce the swelling of wounds, to strengthen broken bones, to expel cold from the body or prevent it from entering, and

⁷ Weddel, p. 531.

⁸ Von Tschudi, p. 453.

⁹ Cobo, pp. 476-477.

¹⁰ Cobo, p. 476.

to cure rotten wounds or sores that are full of maggots.”¹¹ Ruíz, a botanist who did extensive travelling in Peru and Bolivia, mentions that “the natives apply the concoction of this plant with salt in hot baths for oedematous and gouty swellings and for pains in the side; and to relieve the head they take hot infusions of this plant as an aperitive and diuretic remedy to banish gloomy and melancholy choler, to clear the spleen, and to diminish obstructions.”¹² Cobo also mentions the use of powdered coca mixed with salt and egg white to consolidate and repair fractures and disintegration of bone and to relieve painful sores. Furthermore, he relates that the Indians say that the seed of coca, taken in vapor, checks all flow of blood from the nose, while the powder of the leaves, mixed in the proportion of two parts powdered coca to one part sugar, is employed to relieve asthma and hoarseness of the chest. Markham also relates that, among *Cinchona* collectors in the forests of Bolivia, coca was more highly valued as a remedy for malaria than the specific which they were engaged in collecting.

Sergio Quijada in his study on the importance of coca in Indian customs relates several interesting medicinal uses of the plant. For irritation of the eyes, masticated coca is placed as a poultice on the eye during the night; in the morning the eye is washed with lukewarm water of roses or chamomile. For sore throat, a gargle is made from an infusion of coca leaves mixed with a little salt, while for headache two or three coca leaves are chewed and placed on the temples, where they are held by a piece of white flannel until the leaves have dried.

Finally, coca is prized by the Indians as an aphrodisiac, a restorative of lost vigor, and a means of insuring longevity. The fact that the Incan Venus was represented as holding in her hand a leaf of coca has been regarded by some authors as symbolic of the reputed aphrodisiac virtues of the plant. Dr. Unanue speaks of “certain coqueros, eighty years of age and over, and yet capable of such prowess as young men in the prime of life would be proud of.”¹³ Reichel-

Dolmatoff reports that this aphrodisiac effect is well known among the Kógi, but, that after a long period of time, it appears to have the opposite effect, since the men frequently lose interest in women. However, it is not clear whether this is due to actual physical impotency or to the fact that the demands of their spiritual life have become more important than women. The Indians of the Sierra are, furthermore, noted for their longevity, with ages of eighty, ninety, and one-hundred years being quite common; the Indians attribute their longevity and robust health to the use of coca which enables them to resist disease and prevent bodily decay. Von Tschudi mentions that, in the sierra, Indians frequently live to well over one hundred years and makes the following comment: “Setting aside all extravagant and visionary notions on the subject, I am clearly of the opinion that the moderate use of coca is not merely innoxious, but that it may even be very conducive to health. In support of this conclusion, I may refer to the numerous examples of longevity among Indians, who, almost from the age of boyhood, have been in the habit of masticating coca three times a day, and who in the course of their lives have consumed no less than 2,700 pounds; yet, nevertheless enjoy perfect health. I allude here to individuals (and such cases are by no means singular) who have attained the great age of 130. Supposing these Indians to have begun to masticate coca at ten years old, and calculate their daily consumption as a minimum of an ounce, the result is the consumption of 2,700 pounds weight in 120 years.”¹⁴ I have personally encountered such examples of longevity among coca users in the western Amazon; on the Rio Napo in Peru, I met a Huitoto Indian, reportedly over 120 years of age, who claimed that he had chewed coca since he was three years old and had never been sick a day in his life.

Because of the general skepticism of medical doctors today with regard to herbal remedies, it is doubtful that many modern doctors would be as convinced of the curative properties of the coca leaf as are the South American Indians. However, during

¹¹ Garcilasso, p. 509.

¹² Ruíz, p. 198.

¹³ Unanue, 1794.

¹⁴ Von Tschudi, p. 452.



FIG. 7. "Mama Coca Presenting the 'Divine Plant' to the Old World." An aquarelle by Robida. (Frontispiece to Mortimer's *History of Coca*.)

the latter part of the 19th Century, when doctors in the United States and Europe were more familiar with herbal remedies, coca preparations were extensively used therapeutically for many diverse disorders,

and coca enjoyed wide popularity as the basis for various stimulant-tonic preparations, as anyone familiar with the history of Coca-Cola well knows. Coca was widely valued by physicians for its depurative

properties in ridding the blood of waste products of metabolism, particularly uric acid. Coca preparations also were widely employed to treat neurasthenia, nervousness, depression, rheumatism, cardiac irregularities and cardiac weakness, stomatitis, throat infections, asthma and numerous other disorders, and many physicians reported very beneficial results in professional journals. However, even in this period, a prejudice was beginning to form against coca because of rumors of the "cocaine habit." Dr. Mortimer of New York, who employed coca leaves in his practice for nearly 30 years, lamented the reluctance of his contemporaries to recognize the value of coca in the following terms: "That spirit of antagonism which seems rampant at the very suggestion of progress has caused its allies to rehabilitate and magnify the early errors and superstitions whenever opportunity might admit, together with those newer accessions of false premises engendered through shallowness of investigation. Every department of science has been subjected to similar instances of annoyance, though it would appear that medicine is particularly more subject to such influence."¹⁵ The concluding remarks of Dr. Henry Schweig in his article "New Remedies" are very revealing as to the nature of the origin of the prejudice against coca: "The vagaries and wild delusions of writers (non-professional, of course) for the daily press have done much to poison the popular mind regarding coca, and this often proves a serious drawback to the physician. The few cases in which 'cocaine' has been abused have served as a basis for launching forth a wild and wholesale condemnation of a valuable drug. Not one instance has come to my knowledge in which any preparation of coca, intelligently employed, except the alkaloid, has produced even the faintest toxic symptoms. As well discard morphia, chloral, cannabis indica, and the bromides, for the reason that they count the victims to their abuse by the thousands every year. All potent medicinal agents are placed in our hands to be intelligently and temperately employed, not to excess, and the medical man who would hesitate to call to his aid a medicinal agent

for no other reason than it is abused, should be, in my estimation, classed with that horde of fanatics who would interdict the use of alcoholics on the ground of their abuse by a small minority of the population."¹⁶

The reputation that coca use constitutes an addiction only slightly less pernicious than that of opium has remained with the coca leaf and has been the basis for many national and international controls being placed on its distribution and use. Even use of the pure alkaloid cocaine, however, will not produce the same physical addiction as opiates, characterized by the need to increase dosage periodically and by drastic physical withdrawal symptoms. And the distinction between the employment of coca leaves in their crude form by the Indians of South America and the usage of cocaine is even greater. Coca leaves were employed in South America for two thousand years before the discovery of cocaine without producing any marked toxic results. The occasional reports of extreme overindulgence in coca by some coqueros with resulting damage to their physical vigor and mental health represent clearly exceptional cases, and they are certainly not more prevalent than cases of alcoholism and nicotinism in our society. Although an Indian accustomed to chewing coca will, out of preference, return to his habit whenever possible, the Indians of the sierra who are drafted for military service where coca chewing is not permitted do not show any withdrawal symptoms on leaving off the drug. Furthermore, there is no clinical disease which is directly attributable to coca. Although many pathological defects have been suggested as possibly attributable to coca chewing—hyponutrition, ocular disturbances, enlarged thyroid glands and lymph nodes, hepatomegaly, glossitis, stomatitis, and various degenerative stigmata—it remains to be shown which of these conditions, if any, can be attributed solely to the detrimental effects of chewing of the leaf, particularly because, in such cases, it is difficult if not impossible to separate the effects of coca chewing from those of malnutrition, alcoholism, lack of education and social exploitation.

¹⁵ Mortimer, p. 10.

¹⁶ Schweig, Henry, "New Remedies," 1886.

The easiest way to resolve the conflicting reports on the effects of coca use is to recognize the fact that, like any other potent medicinal agent, coca is beneficial when used appropriately and is detrimental when used to excess. Linnaeus considered that a medicine differed from a poison more in its dose than in its nature, and this precept seems applicable to the coca leaf. Another source of confusion is the fact that the effects of the coca leaf often have been presumed to be embodied in the alkaloid cocaine, albeit in a more potent form, with the result that the majority of the physiological research for the last 50 years has been performed solely with cocaine and not with other preparations of coca leaves. However, many physicians have emphasized that the effects of these two are not identical, and particularly that the therapeutic qualities of coca are not represented completely in the active principle cocaine. An important consideration in this regard is that active principles and particularly alkaloids can exert quite different effects when administered as they are naturally combined in the plant than when administered singly in pure form. Very little is known about the physiological activity of the associate alkaloids of the coca plant, and still less about their effects in combination. The necessity of looking into the possible importance of these other compounds is emphasized by the fact that an Indian will frequently reject the bitter coca leaves with the highest percentage of cocaine in favor of the sweeter leaves which are richer in the more aromatic alkaloids. Dr. Henry Rusby, a professor of materia medica sent to Bolivia by Parke, Davis and Co., was among the first to notice this subtle yet important distinction: "It only remains for me to point out that the relative amount of cocaine contained in native coca leaves exerts no influence in determining the Indian's selection of his supply. As a matter of fact, the ordinary conditions to which the leaves are subject during their first two or three months after they are gathered have but little effect on their initial percentages of cocaine. The Indian, however, makes his selection from among such leaves with the greatest care, eagerly seeking the properly

dried leaves from some favorite cocal, whose produce is always most readily bought out, and absolutely rejecting other leaves, notwithstanding that the percentages of cocaine may be almost identical."¹⁷

Although physicians may disagree as to the various effects of the coca leaf, the Indian himself is too familiar with its effects to be bothered by this confusion. Centuries of empirical application of coca have taught the Indian the proper uses of the leaf and the appropriate dosage to be taken for the desired effects. Furthermore, since the South American Indian in general does not have access to well supplied pharmacies, he must rely for the most part on his traditional herbal remedies to preserve his health and treat his ills. For the Indian, coca leaves provide the same benefits that aspirin, coffee, tea, stimulants, sedatives, and numerous other medicaments supply in our society.

In conclusion, I will repeat that coca is an integral part of the Indians' way of life, deeply involved with his traditions, his religion, his work and his medicine. To deny the use of coca to the Indians is as serious a disregard for human rights as would be an attempt to outlaw beer in Germany, coffee in the near east or betel chewing in India. The recent attempts to suppress and control the use of coca can be interpreted only as the latest step in the white man's attempt to exterminate the Indian way of life and make him completely dependent on the alien society and economy which has gradually surrounded him. Henri Lehmann has very accurately stated the severity of the problem in the conclusion to his paper, "The Suppression of the Sale of Coca in Colombia": "The prohibition of the sale of coca is a step forward in the Indians' dependence, it is a step toward his complete enslavement. It is the duty of all the Indian Institutes to interfere in the policy of their administrations to the end that such steps shall not be taken, before it is too late. For several years now, the fight against the Indians has taken new forms. With the pretext of liberating the Indian, for example, many communal lands were dissolved, which has permitted the whites to buy up

¹⁷ Mortimer, p. 183.

Indian lands and evict the natives. The fight against coca by means of such methods as we have here described, has turned upon the very people it is trying to safeguard."¹⁸

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¹⁸ Lehmann, p. 31.

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Notice

Staff of this Branch and State Agricultural Experiment Station cooperators in the Federal-State "New Plants" Project have noted with satisfaction the marked upward trend in the documentary use of Plant Introduction (PI) numbers in research publications. Because PI numbers have usually been transcribed numerous times before appearing in a journal article, errors are not uncommon. To encourage the continued use of PI numbers and to enhance their reliability in providing access to documentary data, we will be glad to check their accuracy prior to publication. In most cases we will need only the PI number and the scientific name of the plant identified with that number. This information should be sent to:

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